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Bibliography on the Tropopause

Vol. 5 April 1954 No. 4

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 5 APRIL, 1954 No. 4

SPECIAL FEATURE IN THIS ISSUE

An Annotated Bibliography on the Tropopause

(For complete table of contents see back cover)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ng to the attention of meteorologists current literature in their field and in related fields and provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, ., arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of important references a special subject. No attempt is made to prepare exhaustive bibliographies; instead, the n is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues of Vol. 1, 1950 were:

Atmospheric Pollution, 2) **Aerobiology,** 3) **Cloud Physics,** 4) **Hail,** 5) **Tornadoes,** 6) **Volcanic st,** 7) **Climatic Changes,** 8) **Thunderstorms,** 9) **Icing,** 10) **Acoustical Propagation** and 11) **aporation.**

Those published in Vol. II, 1951 were:

Extended Forecasting, 2) **Long Range Forecasting,** 3) **Soil Temperature,** 4) **Constants, Tables, .,** 5) **Climate of Near East,** 6) **Climate of Middle East,** 7) **Special Winds,** 8) **Radar Storm tection,** 9) **Condensation Trails,** 10) **Climate of Northeast Africa** and 11) **Mountain Meteorgy.**

Other bibliographies previously published were:

No.	Mo.	Vol. III, 1952	Vol. IV, 1953
1.	Jan.	**Climate—Northwest Africa**	**Turbulence Theory**
2.	Feb.	**Carbon Dioxide**	**Turbulent Diffusion and Exchange**
3.	March	**Climate—Argentina, etc.**	**Frost and Frost Forecasting**
4.	April	**Dew**	**Climate of Australia and New Zealand**
5.	May	**Objective Forecasting**	**High Level Winds (500–100 mb)**
6.	June	**Stratus Forecasting**	**High Level Winds (above 100 mb)**
7.	July	**Urban Climatology**	**Jet Stream**
8.	Aug.	**Climate—Central Africa**	**Radiation Bioclimatology**
9.	Sept.	**Visibility**	**Climatology of the Pacific**
10.	Oct.	**Glaze and Rime**	**Auroras**
11.	Nov.	**Free Air Turbulence**	**Sferics**

Bibliographies published this year are:

1. **General Oceanographic Meteorology,** Vol. V, No. 1, Jan. 1954
2. **Climate of Southeast Asia and Netherlands Indies,** Vol. V, No. 2, Feb. 1954
3. **Physics of Auroras,** Vol. 5, No. 3, March 1954
4. **Tropopause,** Vol. 5, No. 4, April 1954

Forthcoming bibliographies will be:

5. **Balloons,** Vol. 5, No. 5, May 1954
6. **Numerical Forecasting,** Vol. 5, No. 6, June 1954

Other bibliographies in preparation are:

Actinometers
Arctic Meteorology
Climate of the Arctic
Engineering Meteorology
Fog Forecasting
Machine Methods in Meteorology
Microwave Propagation
Night Airglow
Ozone
Radiation Data
Snow Cover
Synoptic Aerology
Tropical Cyclones
Wind Waves and Currents

Part III contains a listing of the contents of those journals which are primarily meteoro- ical. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the December issue nulative author, subject, geographical and journal indexes are published.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where material may be found. The Union List of Serials (Gregory) is the source of most of symbols used. In some cases, where no symbol has been assigned to a library, one will devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory (and American Meteorologi Society) Library, Milton, Mass.
MCM:	Massachusetts Institute of Technology, Cambridge, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
!	before an entry indicates a synoptic case history study accompanied by cha

Geographic locations are in the English form rather than the form used locally, for exam Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherv stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Num (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 (2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

WORKS OF SPECIAL INTEREST

5.4–1 551.507.362

Burgess, E., **High-altitude research.** *The Engineer*, London, 194(5042, 5043):338–340; 70–373, Sept. 12; 19, **1952.** 8+18 figs. **DLC.** Trans. of this article into Russian: **Issledo-anie verkhnikh sloev atmosfery.** *Voprosy Raketnoĭ Tekhniki*, Moscow, 2(14):122–131, **953.** 9 figs. **DLC**—A very informative technical article on the development and use of arious types of rockets for meteorological and cosmic ray research of the atmosphere to 120–35 mi. The work began in 1946 with the flights of the captured V-2 rockets in New Mexico. ater developments were the "Viking," the WAC corporal, the aerobee and, finally, a com-ination of the WAC corporal and the V-2 which reached 250 mi in 2-step firing methods of ıcreasing stability control, payload, recovery of data, telemetering systems and air-borne alibration units. Effects of high speed, limiting time allowed for exposure in solar or ter-estrial photography, and of requiring a sampling rate of 300 times a second are described. t also requires high accuracy in timing and perfect functioning of all equipment under rigid ɔnditions unknown in laboratory or other soundings. Both electronic and mechanical mers are used in the rocket and on the ground (radar and control equipment) to insure erfect timing. Excellent illustrations show the mechanical details and schematic diagrams ıow the location of instruments in several types of rockets. *Subject Headings:* **1. Rocket ıstrumentation 2. Rocket development 3. Translations.**—*M.R.*

5.4–2 551.582.3(43)

*Germany. Deutsche Demokratische Republik. Meteorologischer und Hydrologischer)ienst, **Klima-Atlas für das Gebiet der Deutschen Demokratischen Republik.** [Climatic tlas for the German Democratic Republic area.] Berlin, Akademie-Verlag, **1953.** Each ection repaged. Mostly maps (in color), graphs. 22″×17″. Also: . . . **Klima-Atlas ir das Gebiet . . . Erläuterungen.** [Explanations] **1953.** 19 p. tables, 2 figs. **DWB**—his is the third and most easily handled climatic atlas to be issued for the various major ones of Germany (*see* 2C–177 and 2.11–159, March and Nov. 1951, *MAB.*). The large ıany colored charts are arranged into 5 groups. Pt. I contains 5 general geographic charts relief, geographic regions, soil, plants and climatic zones). Pt. II contains 48 standard imatic charts of mean data and frequencies for the year or for representative months for the ıtire period of record (wind frequencies, temperature, temperature range; hot, cold, frosty, ost free periods, vegetative period, mean cloudiness, precipitation for each month, season, ear and vegetation period, aridity index, hydro and thermal continentality, thunder-orm and fog days, etc.). Pt. III consists of 5 phenological charts, Pt. IV contains 6 charts ving examples of conditions during the cold Jan. (1940), the warm Jan. (1921), the wet eb. (1950) and dry Feb. (1951), the number of days with snow cover in the year of little ıow (1935–36) and the maximum depth during the snowy month of Dec. 1935. Pt. V resents in graphic form data on the departures of monthly mean temperature from the long rm average (7 stations), the daily highest and lowest and mean temperature at Potsdam 1901–1950), the values of soil temperature to 100 cm depth in winter and summer for Potsdam, ariations of precipitation in the year, distribution of monthly precipitation totals for each ıonth (1901–50) and annual totals for each year (1901–50) for a number of stations. Finally, ıe annotations for each chart are quite complete, both in the atlas itself and in the supple-ientary volume which is devoted entirely to explanations of the individual charts. Most of ıe charts are based on the period 1891–1930. For some stations the data are for 1851–1951. *ubject Headings:* **1. Climatic atlases 2. Climatic data 3. Climate of East Germany 4. East ermany. I. Philipps, H.** (*ed.*).—*M.R.*

5.4–3 551.5(02) 551.510:551.5

†Roulleau, Jean and Trochon, R., **Météorologie générale, tome I: Structure vertic de l'atmosphère. L'atmosphère et les phénomènes de rayonnement.** [General meteorolo Vol. I: Vertical structure of the atmosphere. The atmosphere and the phenomena of radi tion.] Paris, Gauthier-Villars, **1952.** 149 p. 47 tables, 46 figs., eqs. p. 143–145. *Mo graphies de Météorologie* [unnumbered]. **DWB**—Without going too much into theoreti details, the authors present a textbook, acquainting the student mainly with the observation basis of meteorology, discussing vertical, diurnal and seasonal variations of meteorologi elements, including ozone, carbon dioxide and nuclei. A new feature, usually missed similar books, is numerous graphs and data, showing the frequency distribution of te perature and its lapse rate, as well as of pressure, humidity and of the standard atmosph from the earth's surface up to the stratosphere. The second part deals with solar radiatio its diffusion and selective absorption, earth's and atmospheric long wave radiation (diagra of ELSASSER and KEW) and with the influence of nuclei on radiation phenomena. Furth more, the radiation balance of the system earth-atmosphere, of the soil, the troposphere a the stratosphere are described, giving the basic formulas and numerical data. *Subject Hea ings:* **1. Meteorology textbooks 2. Atmospheric structure 3. Radiation.**—*A.A.*

5.4–4 551.507.362:551.510.

Van Allen, James A. (*Appl. Physics Lab., Silver Spring, Md.*), **Use of rockets in upp atmosphere research.** *I.U.G.G. Association of Terrestrial Magnetism and Electricity, IATM Bulletin*, No. 13:531–536, **1950. DWB**—The first successful flight with instruments heights >37 km were made with captured U-Z rockets. Beginning with April 16, 1946 (t first one was a failure) up to July 1, 1948, 31 V-2's were fired (with upper air research equi ment attached) and 21 flights were successful. Highest flight was 184 km; average 135 k (a WAC Corporal was fired in Oct. 1945 with a maximum altitude of 72 km, but with only 10 kg payload). A summary of results to date, the use of the aerobee, practical aspects rocket research, and the institution cooperating in the program, and the rocket technique upper atmosphere research are outlined in this report. *Subject Headings:* **1. Rocket researc 2. Upper atmosphere research.**—*M.R.*

5.4–5 551.311.1(02) 551.46(02) 551.5(26)(0

†Vercelli, Francesco (*Istituto Talassografico di Trieste*), **Il mare—I laghi—I ghiaccia** [Ocean, lakes, glaciers.] Turin, Unione Tipografico—Editrice Torinese, **1951.** 622 numerous photos, figs., charts, illus., bibliog. xiii–xvi. Italian. Review available at **DWI** Vatova, A., **L'Idrosfera e le sue condizioni.** [The hydrosphere and its conditions.] [1952? **DWB**—A comprehensive, popularly written and profusely illustrated coverage of physic and dynamic oceanography, marine meteorology and morphology, sedimentation, limnolog snow and glaciers. Chap. 5 (p. 149–168) includes discussion of evaporation, heat exchang and effects of ocean and atmosphere on one another. Other manifestations of ocean-atmos phere interaction discussed in Chap. 9 (waves) and Chap. 10 (circulation). This is believe to be the first attempt at so broad, voluminous and vivid a coverage of the many aspects oceanographic, limnological and glaciological activity enumerated above. A few colore charts and a number of tables and graphs giving quantitative data on each of the topics covere gives the work a superficial resemblence to SCHOTT's classical works on the geography of th Atlantic or of the Pacific and Indian Oceans. (*Same item as* 5A–54, Jan. 1954, *MAB.*) *Sub ject Headings:* **1. Textbooks 2. Oceanography 3. Marine meteorology 4. Ice 5. Glacier 6. Oceanography textbooks. I. Vatova, A.**—*M.P.K.*—*M.R.*

5.4–6 550.3:06

Zeitschrift für Geophysik, Sonderband. [Special issue.] **1953.** 192 p. diagr., ref Names and addresses of members of the Deutsche Geophysikalische Gesellschaft, p. 186–191.– The first volume of this journal was published in 1924/25 as the medium of the "Deutsch Geophysikalische Gesellschaft," the latest previous (18) volume in 1943/44. This speci issue is devoted to the 30th anniversary of the society which has held 19 scientific meetin up to this time. Papers of interest for meteorologists are abstracted separately. *Subje*

Headings: **1. Geophysical serials 2. Geophysical societies 3. Germany. I. Deutsche Geophysikalische Gesellschaft II. Brockamp, B.** (*ed.*).—*A.A.*

GENERAL METEOROLOGY

See also: **General met.** (Roulleau, Trochon), 5.4–3; **Oceans, lakes, glaciers** (Vercelli), 5.4–5; **Met. instrument technique** (Raethjen), 5.4–48.

5.4–7 551.5

Cowen, Robert C. and Landsberg, Helmut, **Probing earth's secrets.** *Christian Science Monitor*, June 28, 30, July 5, 7, 12, 14 and 19, **1951.** photos. Abstracted from reprint. **DWB**—The work of the Geophysical Research Directorate of the Air Force Cambridge Research Laboratories is brought to the general public in this series of 7 articles. In the introductory article HELMUT E. LANDSBERG determines the field and explains the importance of geophysics. The remaining 6 articles are by ROBERT C. COWEN of the Christian Science Monitor and bear the titles: 2. Air center set for research in geophysics; 3. Air Force lifts lid on secrets of atmosphere; 4. Probing sound waves aid in study of atmosphere; 5. Rocket 'labs' keep Air Force informed; 6. U. S. Air Force seeks to end guesswork in forecasts; 7. Radio waves investigate ionosphere. A few photos, mostly showing equipment, are added. *Subject Headings:* **1. Geophysical research 2. Meteorological research 3. Popular science 4. U. S. Air Force. Cambridge Research Center. Geophysics Research Division.**—*G.T.*

5.4–8 551.5(02)

Chesters, A. O., **What causes things. Weather.** London, Educational Supply Association, **1951.** 96 p. figs. **GB-MO**—A very popular account of elementary meteorology—clouds, wind, sun, rain, thunder, etc., illustrated by lively sketches. *Subject Headings:* **1. Manuals 2. Elementary meteorology.**—*C.E.P.B.*

5.4–9 551.5(411):8

Geddes, Arthur, **Weather through the seasons on crag and peak, as sung in Gaelic songs.** *Weather*, 6(8):243–246, Aug. **1951.** 5 refs. **DWB**—Includes a number of translations from Gaelic songs describing weather in the Scottish Highlands and Isles. *Subject Headings:* **1. Weather in literature 2. Folk songs 3. Scotland.**—*C.E.P.B.*

5.4–10 551.5(438)

Zych, Stanisław, **Stan meteorologii w Polsce.** [The state of meteorology in Poland.] *Przegląd Meteorologiczny i Hydrologiczny*, 1950/1951:303–310, **1951. DWB**—A review of meteorological literature from 1945–1950. Reasons for the present needs in the field of meteorology in Poland. *Subject Headings:* **1. Progress in meteorology 2. Poland.**—*W. Tomczyskowski.*

5.4–11 551.5:001

Chapman, Sydney and Bonacina, L. C. W., **Nomenclature in meteorology.** *Weather*, 8(2):62, Feb. **1953. MH-BH**—Chapman suggests "aeronomy" for study of atmosphere above tropopause. Bonacina also comments on O. G. SUTTON's letter (*Weather*, 7(12):386, Dec. 1952). *Subject Heading:* **1. Definitions.**—*C.E.P.B.*

5.4–12 551.5:001

Sutton, Oliver Graham, **Nomenclature in meteorology.** *Weather*, 7(12):386, Dec. **1952. MH-BH**—Suggests revised definitions of Climate, Weather, Micro-climate. *Subject Heading:* **1. Definitions.**—*C.E.P.B.*

5.4–13 551.5:001.4

Meynier, André (*Univ. of Rennes*), **Tropical et subtropical, une question de vocabulaire.** [Tropical and subtropical, a question of vocabulary.] *Revue de Géographie de Lyon*, 28(1):53–56, **1953.** ref. **DWB**—The author discusses various interpretations of the word "sub-

tropical," its meaning in climatology, dynamic meteorology and plant geography, and application to various border-line regions. He suggests his own definitions of the ter "equatorial," "tropical," "arid" and "subtropical," this latter including "Mediterranean" a "South-Chinese." *Subject Headings:* **1. Terminology 2. Tropical meteorology.**—*G.T.*

5.4–14 551.5:016(52) 551.5:06(5

†Hatakeyama, Hisanao and Syono, Sigekata, **Meteorological researches in Japan duri 1948–1950.** *I.U.G.G. Association of Meteorology, Brussels, 1951, Rapports Nationau* p. 14–36, June **1952.** bibliog. **DWB**—Detailed account of meteorological research Japan, conducted by the Central Meteorological Observatory, local observatories, the meteo logical divisions of universities and the Meteorological Research Institute. Extensive bib ography of papers, published in 9 meteorological or geophysical journals, covers all fields meteorology. No attempt was made to list meteorological papers published in Japan geographical, agricultural, forestry and other journals. *Subject Headings:* **1. Meteorologi research 2. Bibliographies 3. Japan.**—*A.A.*

5.4–15 551.5:0

†International Union of Geodesy and Geophysics. Association of Meteorology, Brusse 1951, **Rapports Nationaux.** *I.U.G.G. Association of Meteorology, Publication,* No. 9/ June **1952.** 99 p. Articles in French or English. **DWB**—Collection of 18 national report a great part of which contains specific information on meteorological research and exclusi bibliographies. *Subject Headings:* **1. Meteorological research 2. Meteorological servic 3. Bibliographies.**—*A.A.*

5.4–16 551.5:016(94) 551.5:06(9

†National report on Australian meteorological research, 1948–1951. *I.U.G.G. Associ tion of Meteorology, Brussels, 1951, Rapports Nationaux,* p. 8–13, June **1952. DWB**—List some 40 references characterizes scientific activity in the fields of tropical and antarctic meteo ology, dynamic meteorology and general circulation, surface meteorology, humidity, conve tion, cloud physics, upper atmosphere and climatology. *Subject Headings:* **1. Meteorologic research 2. Australia.**—*A.A.*

5.4–17 551.5:016 55:01

†Pretoria. State Library, **Physical geology and meteorology; a select list of U. S. Gover ment publications.** *Pretoria. State Library, Smithsonian bibliography,* No. 35, **1952.** 14 **DLC**—A list of U. S. Government publications (and publications of the Carnegie Institutio of Washington) available in the Smithsonian (Exchange) Collection of the Pretoria Sta Library. One hundred and seventy-two items are listed (most of them published betwe 1930 and 1950) in a subject arrangement covering the fields of (a) physical and dynam geology, (b) hydrography and hydrology and (c) meteorology. The section on meteorolog (general, circulation, temperature, pressure, storms, humidity, condensation and evaporatio precipitation, climate and weather) contains 85 references. *Subject Headings:* **1. Meteorolog 2. Geology 3. Publication lists.**—*G.T.*

5.4–18 551.5:016 550.3:01

†Revista de Geofísica, Indice general de los años 1942 a 1952. [Cumulative index f 1942–1952.] *Revista de Geofísica,* Madrid, 11(44):362–454, Oct./Dec. **1952. DWB**—Ab stracts of papers published in volumes 1–11 (1942–1952) of *Revista de Geofísica.* The entri are arranged in 10 sections: gravimetry, seismology, prospecting, meteorology, magnetism astronomy, radioactivity, geochronology, oceanography and miscellaneous. The section o meteorology contains abstracts of 72 papers. *Subject Headings:* **1. Meteorology 2. Ge physics 3. Abstracts 4. Bibliographies.**—*G.T.*

5.4–19 551.5:06(0

Ashford, O. M., **The first International Meteorological Conference, Brussels 185** *Weather,* 8(5):153–154, May **1953. MH-BH**—Brief account of conference of Aug. 23, 185 due to M. F. MAURY, and dealing with marine meteorology. *Subject Headings:* **1. Meteor logical conferences 2. History of meteorology.**—*C.E.P.B.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Account of inside of tornado** (Molen), 5.4–107; **Influence of field of view on atmos. transmission measurements** (Stewart, Curcio), 5.4–117; **Atmos. inhomogeneity in vertical temp. soundings** (Sawyer), 5.4–134; **Causes of secular temp. trends** (Mitchell), 5.4–140; **Determination of cloud-droplet impingement on swept wings** (Dorsch, Brun), 5.4–193; **Radar observations of rain from non-freezing clouds** (Styles, Campbell), 5.4–196; **Snow survey in Himalayas** (Dhir), 5.4–198; **Snow investigation in Norway** (Klaeboe), 5.4–199; **Canadian snow survey, 1947–50** (Pearce, Gold), 5.4–200; **Determination of moisture content of soils** (di Gléria), 5.4–206; **Soil moisture measurement** (Szilágyi), 5.4–208; **Soil moisture measurement** (U. S. Forest Serv.), 5.4–209.

5.4–20 551.501:551.521

CHikirova, G. A., **Radiatsionnyĭ balans po dannym nabliudeniĭ na stantsii Dolgoprudnoĭ.** [Radiation balance established from observational data at Dolgoprudnaia Station.] *Leningrad. Glavnaia Geofizichaskaia Observatoriia, Trudy*, 16(78):121–124, **1949.** 2 figs., 2 tables, 5 refs. **DLC**—General account on the measurement of the radiation balance by means of a thermoelectric balance-meter according to MIKHEL'SON-IANISHEVSKIĬ during an expedition, devoted to the study of atmospheric turbulence. Data give daily totals of the radiation balance and show its diurnal variation. *Subject Headings:* **1. Radiation measurement 2. Radiation balance 3. Dolgoprudnaia Station, U.S.S.R.**—*A.A.*

5.4–21 551.501:551.508.77

Glasspoole, John, **Surface-tension and the readings of raingauges.** *Weather*, 8(3):93–94, March **1953. DWB**—Referring to letter by J. BIRKETT (*Weather* Dec. 1952), loss by evaporation of water drops caught on the funnel occurs in new gages but is small and is compensated by dew formed at night. *Subject Heading:* **1. Rainfall measurement.**—*C.E.P.B.*

5.4–22 551.501:551.574.41

Gold, E., **Evaporation of dew from funnel of rain-gauge.** *Meteorological Magazine*, London, 82(978):375–376, Dec. **1953. MH-BH**—Dew was found on the outside but not inside the funnel of a copper raingage. This is attributed to heat radiated from the part of the gage buried in the ground. It is estimated that a depth of 0.1 mm may be lost in 6 hrs. *Subject Heading:* **1. Evaporation of dew.**—*C.E.P.B.*

5.4–23 551.501:681.14

Ishiguro, Shizuo, **A magnetic recording method for input of electronic analogue computers.** *Oceanography and Meteorology*, Nagasaki, 5(3/4):75, Dec. **1951.** 2 figs. In Japanese. **DWB**—The recording instrument is described and its operation explained. A circuit diagram and a diagram showing the trace needle's design are presented. *Subject Heading:* **1. Electronic computers.**—*G.T.*

5.4–24 551.501:551.55

Ledneva, K. V., **Veter v usloviiakh ekspeditsii na stantsii Dolgoprudnoĭ.** [Wind conditions during an expedition at Dolgoprudnaia Station.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Trudy*, 16(78):125–130, **1949.** 3 figs., 3 tables. **DLC**—General account on the measurement of wind speed and direction by means of contact anemographs during an expedition devoted to the study of atmospheric turbulence. Parallel measurement data are given for a set of anemometers. *Subject Headings:* **1. Wind measurement 2. Dolgoprudnaia Station, U.S.S.R.**—*A.A.*

5.4–25 551.501:551.508.71

Mosetti, Ferruccio, **Su una possibilità d'impiego del nefelometro.** [On a possible application of néphelometers.] *Annali di Geofisica*, 5(4):591–595, Oct. **1952.** 4 figs., 2 refs. English summary p. 595. **MH-BH**—A diagram showing the empirical law between polarized light diffused by the atmosphere and the percent humidity is presented. It is further shown how,

by using this diagram, one can obtain information about non-uniform distribution of humidity with altitude. *Subject Headings:* **1. Nepheloscopes 2. Humidity measurement 3. Humidity diagrams.**—*Author's abstract.*

5.4–26 551.501.1:551.577

Grunow, J., **Zur Niederschlagsmessung im Gebirge.** [Precipitation measurement in the mountains.] *Wetter und Leben*, 5(1/2):35–37, March **1953.** 2 refs. **MH-BH**—Precipitation measurement in mountainous regions is rendered complicated by the water value of snow residue and the influence of wind and terrain. The use of slope parallel collectors in regions of mountains at about 3000 ft elevation is illustrated by a specific example. The use of a net collector for measuring fog precipitation is discussed. *Subject Headings:* **1. Precipitation measurement 2. Mountain effects.**—*I.L.D.*

5.4–27 551.501.1(26)

Williams, C. H. and Radley, J. R., **Hints on observing. 1. The thermometer screen.** *Marine Observer*, 22(158):205–208, Oct. **1952.** 3 figs. **2. Sea surface temperature.** *Ibid.*, 23(159):23–28, Jan. **1953.** 3 figs., photo. **3. Wind.** *Ibid.*, 23(160):89–93, April **1953.** 7 figs. **DWB, MH-BH**—1. Simple description of dry- and wet-bulb thermometer and its management, siting of screen in free flow of air, and use of observations in ventilation of cargo. 2. Instructions on observing by bucket method and engine room intake (less reliable), coding observations and use of observations on board ship and in forecasting. 3. Tabulation of ships' wind scale of 1769 and different criteria of Beaufort scale, 1806, 1874, 1906, with notes on estimating force at sea. Photographs show state of sea with various Beaufort forces. *Subject Headings:* **1. Marine meteorological observation 2. Thermometer screens 3. Marine meteorology 4. Sea surface temperatures 5. Beaufort scale.**—*C.E.P.B.*

5.4–28 551.501.7:551.576.1:551.515.4

Day, G. J. and Murgatroyd, R. J., **The cumulus cloud investigations made by the Meteorological Research Flight during the period August 4th–15th, 1952.** *Great Britain. Meteorological Research Committee, M.R.P.* 826, July 21, **1953.** 34 p. 20 figs., 16 tables. Mimeo. **GB-MO**—Eight flights in selected Cu, CuNb or StCu clouds are described. Results, including temperature, frost point, icing rate, turbulence, droplet spectrum, ice crystals and vertical motion are presented in detail and discussed. Points are: detailed cloud forecasting; entrainment (important near base of a large cu, decreasing at higher levels); cloud structure and composition; vertical motions and turbulence; water content and icing; field below cloud base. *Subject Heading:* **1. Cumulonimbus clouds.**—*C.E.P.B.*

5.4–29 551.501.81:551.515:77

Foster, Hal, **Radar and the weather.** *Scientific American*, 189(1):34–38, July **1953.** illus. **DLC**—The present-day use of radar by the U. S. Air Force, U. S. Weather Bureau and research institutions to locate areas of showers, rain, icing, turbulence or stability, storms and hurricanes is described and many illustrations of the horizontal and vertical structure of such areas on the PPI or RHI indicator shown by radar scope photographs. *Subject Headings:* **1. Radar storm detection 2. Radar photographs.**—*M.R.*

OBSERVATIONAL DATA

See also: **Construction of wind velocity frequency curve** (Lorente), 5.4–152.

5.4–30 551.506.1(728.4)

*El Salvador. Servicio Meteorológico Nacional, **Boletín Meteorológico de El Salvador.** v. 1, No. 1, Jan. **1953**; latest issue received, v. 1, No. 8, Aug. **1953.** Monthly, about 8 p. per issue. tables, graphs. **DLC, DWB.** Continuation of: *San Salvador. Instituto Tropical de Investigaciones Científicas, Boletín Meteorológico de San Salvador.* v. 1(1)–2(13), **1951–1953. DLC, DWB**—Data on daily numbers of hours with specified temperature and humidity values (San Salvador), on the monthly march of wind, evaporation and relative humidity (San Sal.), on soil temperature variations, means and extremes down to 1 m (San Andres, San Salv.)

and on sunshine, wind distribution, relative humidity, temperature and precipitation (San And., San Salv.) are presented in tables or graphs. A weather summary for the month, and monthly average data from substations are added. *Subject Headings:* **1. Monthly data bulletins 2. El Salvador.**—*G.T.*

5.4–31 551.506.1(42)

*Fernley Meteorological Observatory, Southport, **Report and results of observations for the years 1942–1945 (inc.).** By George A. Lidster. **1950.** 58 p. tables. **GB-MO**—This very thorough series of tables includes means and extremes of pressure and temperature, soil temperatures (grass min., 1, 4, 10 and 20 ft.), sunshine, UV radiation, cloud, humidity, wind, rainfall, evaporation, water level, etc. with differences from long-period averages, and summaries of visibility and atmospheric pollution. Hourly means of wind, rainfall and sunshine for each month are included. (For Report for 1948 *see* 3.3–38, March 1952, *MAB.*) *Subject Headings:* **1. Climatic data 2. Southport, England. I. Lidster, George A.**—*C.E.P.B.*

5.4–32 551.506.1(42)

*Kew Observatory, Richmond, **Weather report for week ending Jan. 6th., 1951.** 1 p. Richmond, 1951. **GB-MO**—The first issue of a new weekly bulletin giving daily observations of air and earth temperature, humidity, wind, sunshine, rainfall and radiation at Kew Observatory, Surrey. *Subject Headings:* **1. Observational data 2. Weather reports 3. Kew Observatory, England.**—*C.E.P.B.*

5.4–33 551.506.1(411) 551.582(411)

Skelton, Philip Norman, **Weather experienced in Eskadalemuir about 120 years ago.** London, Meteorological Office, **1915.** 6 p. 4 tables. Typescript. **GB-MO**—Account of a diary kept by Rev. William Brown at Eskdalemuir, Scotland, May 1799–Dec. 1810. Gives monthly mean temperatures and extremes, numbers of wet days, and notes on seasons 1674 and 1739–1808. *Subject Headings:* **1. Historic weather records 2. Eskdalemuir, Scotland. I. Brown, William.**—*C.E.P.B.*

5.4–34 551.506.1(68)(058)

Climate and meteorology. *South Africa. Office of Census and Statistics, Official Year Book of the Union and of Basutoland, Bechuanaland Protectorate and Swaziland,* No. 24:21–35, **1948** (publ. Aug. 1950). chart, extensive tables. **DWB**—Description of general conditions over the Union and tables of average conditions for all stations with over 15 years record. Two page report on activities and organization of meteorological service. A more comprehensive article is found in *Official Year Book,* No. 21, 1940. *Subject Headings:* **1. Climatic data 2. Meteorological services 3. Yearbooks 4. Union of South Africa.**—*M.R.*

5.4–35 551.506.1(611)

*Tunis. Service Météorologique, **Normales et statistiques, diverses.** [Various normals and statistics.] *Tunis. Service Météorologique, Études Météorologiques, Climatologie de la Tunisie,* I, Aug. **1952.** 33 p. mostly tables, diagr. (fold.) **DWB**—This monograph contains temperature and rainfall normals based upon the period 1901–50; relative humidity and evaporation normals (Piché evaporimeter) for period 1946–1950; velocity and direction of surface winds for 1943–1950, monthly duration of insolation (1927–48) and monthly averages of desert hourly solar radiation (1924–1927) and global radiation for one station, and mean number of days per month (1946–1950) with thunderstorms, violent winds, ice beneath the shelter and rainfall. A list of the weather stations and a map showing their locations are included. *Subject Headings:* **1. Climatic data 2. Long period records 3. Tunisia.**—*I.L.D.*

5.4–36 551.506.1(754):629.13

*U. S. Weather Bureau, **Local climatological data, Charleston, West Virginia (Kanawha Airport), Dec. 1952. Based on one month's record.** 1 leaf+1 leaf of supplement. all tables. Price: $.50 per year including annual summary if published. Separate copies, monthly .05 each; annual .10 each. **DWB**—This monthly tabulation shows daily and 6-hourly

weather, hourly temperature and precipitation and frequencies of wind, precipitation, sky cover, relative humidity, visibility and ceiling. *Subject Headings:* **1. Airways climatic data 2. Charleston, W. Virginia.**—*C.E.P.B.*

5.4–37 551.506.1:63(73)

*U. S. Weather Bureau, **Weekly Weather and Crop Bulletin: National Summary.** Began publication **1924**; Latest issue received 39(39), for week ending Sept. 23, **1952.** (1948 lacking). Previously published in *U. S. Weather Bureau, Weather, Crops and Markets* (1922–1923), and prior to that in *U. S. Weather Bureau, National Weather and Crop Bulletin.* **DWB**—Each of these 4-page bulletins summarizes weather of the week and effect on farming, for the country as a whole and each State. Tables give average temperature, total precipitation and departures from normal for numerous stations; temperature departures and total precipitation are shown on charts. *Subject Headings:* **1. Weather and crop bulletins 2. United States.**—*C.E.P.B.*

5.4–38 551.506.1(73)

Weatherwatch. Published by the Amateur Weathermen of America, Franklin Institute, Philadelphia. First issue received v. 1, No. 1, Jan. **1948;** last issue published, v. 4, No. 10, Oct. **1951.** illus. Price: **$1.50** per year. **DWB**—*Weatherwatch* (now discontinued) contained a chronological series of items about weather conditions throughout the United States during each month, charts of monthly mean temperature and departure from normal, and total precipitation and departure from normal, highest temperature and lowest temperature observed during the month throughout the United States (based on one or more stations in each state). Comparison of extremes during the month with absolute extremes of temperature, precipitation and pressure are shown on graphs. *Subject Headings:* **1. Monthly summaries 2. Extreme temperatures 3. Climatic data 4. Periodicals 5. United States. I. Amateur Weathermen of America, Philadelphia II. Cameron, Donald C.**—*M.R.*

5.4–39 551.506.5(99) 91.04(99)

Loewe, Fritz, **Geschichte und Arbeiten der französischen Antarktis-Expedition nach Adélieland 1948 bis 1952.** [History and work of the French Antarctic Expedition to Adelie Land 1948–52.] *Naturwissenschaftliche Rundschau,* 6(6):231–238, June **1953.** 8 figs., table, 6 refs. **DWB**—General account of the expedition with map of sledge journeys, preliminary account of scientific work with table of wind speed and mean temperatures at Port Martin in 1951. The physiological effects of strong wind at low temperature are described; also blizzards and atmospheric electricity. *Subject Headings:* **1. Antarctic expeditions 2. Physiological climatology 3. Adélie Land, Antarctica.**—*C.E.P.B.*

INSTRUMENT CARRIERS

See also: **High alt. research** (Burgess), 5.4–1; **Rockets in upper atmos. research** (Van Allen), 5.4–4; **Mobile low-level sounding system** (Lowell, Hakkarinen, Randall), 5.4–46; **Shearing stress determination from airplane in flight** (Bunker), 5.4–150.

5.4–40 551.507.321.4:551.551

MacCready, Paul B., Jr., **Atmospheric turbulence measurements and analysis.** California Institute of Technology, Contract Cwb-8290, [unnumbered report], Oct. 15, **1952.** 26 p. 10 figs., eqs., 11 refs. **DWB**—Methods of measuring the velocity distribution, frequency spectra, autocorrelation coefficients and heat flux at a given elevation are described and illustrated. The measurements are made at elevations up to several hundred meters by use of a multi-cable tethering system for the instrument supporting balloon. Hot wire anemometers mounted on poles are used for frequencies from 0 to 50 cycles/sec and speeds of 0.25 to 20 m.p.s. The analysis is made from magnetic tape-recorder records. This equipment is described and illustrated, records reproduced and advantages cited. *Subject Headings:* **1. Turbulence measurement 2. Hot wire anemometers 3. Captive balloons. I. California Institute of Technology II. Contract Cwb-8290.**—*M.R.*

INSTRUMENTS

See also: **Surface-tension, reading of rain gages** (Glasspoole), 5.4–21; **Possible application of nephelometers** (Mosetti), 5.4–25; **Shearing stress determination from airplane in flight** (Bunker), 5.4–150; **Vertical air motion in lowest atmos.** (Frankenberger), 5.4–168; **Soil moisture measurement with fiberglass instrument** (U. S. Forest Serv.), 5.4–209.

5.4–41 551.508:681.2

Benton, George S. and Covey, Winton, **Measurement of meteorological variables by use of multiple energy-balance indicators.** *American Geophysical Union, Transactions*, Pt. 1, 33(5):673–679, Oct. 1952. 7 refs., 8 equations. **MH-BH**—This paper is a preliminary report on the promising field experiments at Johns Hopkins University with a novel multiple energy balance indicator, the capabilities of which (as a combined and reliable thermometer, anemometer and radiation meter) are discussed along with a description of the instrument itself. Simultaneous equations will provide the possibility of statistical determination of the meteorological variables. *Subject Heading:* **1. Recording equipment.**—*W.N.*

5.4–42 551.508:621.398

Ezhov, A. A., **Distantsionnaia meteorologischeskaia stantsiia A. N. Mal'tseva.** [A. N. Mal'tsev's distant-recording meteorological station.] *Meteorologiia i Gidrologiia*, No. 6:43–47, 1952. 4 figs. **DLC**—The meteorological equipment designed by A. N. Mal'tsev was tested in practice at Sverdlovsk during the last four years and showed good results. The author presented a detailed description of the distant-recording station, which can indicate air temperature, humidity, and direction and velocity of wind, with accuracy for temperature ±0.2° to ±0.3°C, and for humidity ±5%. The accuracy of wind measurements is not lower than that of usual wind vanes. Special potentiometers placed into remodeled thermohygrograph and Wild's wind vane and connected with voltmeter by ten wires show on four scales the values of temperature, humidity and wind direction and velocity. *Subject Headings:* **1. Distant recording equipment 2. Mal'tsev, A. N.**—*N.T.Z.*

5.4–43 551.508:551.584

Gerhardt, John R. and Gohlke, R., **Some recent developments in micrometeorological instrumentation.** Texas. University, Electrical Engineering Research Laboratory, Contract N6onr-266, Task Order 2, Report No. 28, June 15, 1949. 18 p. 10 figs., 2 refs. **DWB**—A review of some of the recent developments in the specialized instrumentation required for micrometeorological research is presented. Emphasis is laid on the various automatic switching mechanisms required for taking rapid step-type soundings. Two types of an integrating mechanism used to reduce the labor involved in the routine statistical analysis of recorded data are described. The construction and operating characteristics of a wind tunnel for the calibration of hot-wire and heated thermistor anemometers are shown in some detail. *Subject Headings:* **1. Micrometeorological instrumentation 2. Anemometer calibration 3. Wind tunnels. I. Contract N6onr-266, Task Order 2 II. Texas. Univ. Electrical Engineering Research Laboratory.**—*Authors' abstract.*

5.4–44 551.508(02)

†Kedrolivanskiĭ, V. N., **Meteorologicheskie pribory.** [Meteorological instruments.] Moscow, Gidromet. Izdat., **1937.** 321 p. 250 figs., tables, 85 refs., eqs. Microfilm copy in U. S. Weather Bureau. **DWB**—A most complete manual for observations and maintenance of instruments, as of 1937, in the hydrometeorological service of the U.S.S.R. The first chapter goes extensively into determination of time in all its aspects; Chap. II. Pressure measuring instruments; Chap. III. Temperature; Chap. IV. Evaporation; Chap. V. Humidity; Chap. VI. Precipitation; Chap. VII. Cloudiness; Chap. VIII. Solar radiation; Chap. IX. Visibility; Chap. X. Wind and Chap. XI. The work of recording and compiling meteorological observations at stations. Most detailed photographs and line drawings of working parts of the various instruments, and example of records are included. Conversion and reduction tables are included or appended. Theory and calibration or correction of the various instruments profusely incorporated. *Subject Headings:* **1. Meteorological instruments 2. Observational techniques 3. Instrument calibration 4. Textbooks 5. Instrument manuals.** —*M.R.*

5.4–45 551.508

Kiprenskiĭ, A. B., **Novyĭ etalon dlia spektrometricheskikh izmereniĭ.** [A new calibration instrument for spectrophotometric measurements.] *Priroda*, Moscow, 9:62–64, Sept. **1952.** fig. **DLC**—A description of a "model black body" developed by S. F. SITNIK of the Kuchin Observatory of P. K. Shternberg State Astronomical Institute, is presented. The model black body was constructed on the principle of the King electric vacuum oven and attained temperatures exceeding that of molten platinum. A graphite tube was inserted into a vacuum and heated by an alternating electric current. The heated tube in turn heated another tube inserted in it in such a way that both have an electrical contact with one another. The latter tube becomes uniformly and constantly heated and within this second tube was constructed a closed hollow. The regulation of the heat regime was by means of thermocouples. Its use is described. A diagram of the model black body is given. *Subject Headings:* **1. Calibration equipment 2. Spectrophotometers.**—*I.L.D.*

5.4–46 551.508:551.507.321.4

*Lowell, P. D.; Hakkarinen, W. and Randall, D. L., **National Bureau of Standards mobile low-level sounding system.** *U. S. National Bureau of Standards, Journal of Research*, 50(1):7–17, Jan. **1953.** 6 tables, 14 figs., 12 refs. **DWB**—Details of component parts, calibration procedure, flight computations and tests, etc. are given in text, tables, wiring and other schematic diagrams and photographs. The equipment is designed to measure pressure, temperature and moisture distribution and gradients from the surface up to 2000 ft over different types of terrain. It is a combination of an improved wired sonde and Army SCM-1A Mobile Meteorological Station. For obtaining refraction index gradients used in tropospheric radiowave propagation measurements, this system has several advantages over radiosondes (too fast ascent), towers (300–400 ft maximum height) or wired sondes (uncertain height and low ceiling). *Subject Headings:* **1. Reproductive index measuring equipment 2. Low level sounding systems 3. Wired sondes.**—*M.R.*

5.4–47 551.508

Medi, Enrico, **Una soluzione del problema delle registrazioni meccaniche.** [Solution of the problem of mechanical recording.] *Annali di Geofisica*, 5(4):501–505, Oct. **1952.** 2 figs. English summary p. 505. **MH-BH**—An arrangement has been proposed which permits the beam of light reflected from the mirror of an instrument to fall constantly on the same surface of a photoelectric cell. The system consists of a concave mirror; the instrument and the photoelectric cell are placed near the center of curvature of this mirror. The mirror is conveniently and partially shielded with a screen which modifies the intensity of the reflected light as a function of the position of the image of the source on the mirror, and thus a function of the deviation of the instrument. *Subject Heading:* **1. Recording equipment.**—*Author's abstract.*

5.4–48 551.508:551.501.1

Raethjen, Paul and others, **Anleitung für das meteorologische Instrumenten-Praktikum.** [Introduction to meteorological instrument technique.] Hamburg, [n.d.] 80 p. 17 figs., eqs. **GB-MO**—Concise instructions in the use of some of the less usual meteorological instruments as well as a normal station handbook. Included are Wigand visibility meter, dew point mirror and humidity absorption methods, Aitken counter, wind channel observations, chapters on upper wind measurement and meteorographs, cooling power, Michelson actinometer, electrometer, hypsometer. Mainly written by PAUL RAETHJEN. *Subject Headings:* **1. Meteorological instruments 2. Instrument manuals. I. Hamburg, Universität. Meteorologisches Institut.**—*C.E.P.B.*

5.4–49 551.508:621.398

Sanuki, M.; Oki, S. and coll., **A remote-reading instrument board for weather station.** *Papers in Meteorology and Geophysics*, Tokyo, 3(3):175–182, Jan. **1953.** 5 figs., table, 4 refs. **MH-BH**—The equipment described was installed in Dec. 1951 at the Maebashi Weather Station, Japan. It comprises wind vane, anemometer, six thermometers, aneroid barometer,

barograph, statoscope, mercurial barometer, rain gage, observation clocks, indicators and recorders. Accuracies of the instruments are shown in a table. The arrangement of the instrument board is illustrated. Photographs of some of the instruments are presented. Measurement of each of the elements is discussed. Preliminary tests with good results are mentioned. *Subject Headings:* **1. Distant recording equipment 2. Instrument accuracy 3. Maebashi Weather Station, Japan.**—*G.T.*

5.4–50 551.508

Suzuki, S., **Differential recorders of meteorological elements.** *Geophysical Magazine*, Tokyo, 24(3):171–179, Jan. **1953.** 4 figs., 5 refs., 30 eqs. **MH-BH**—Three instruments, the differential thermograph, barograph and pluviograph are described and illustrated. They supply direct records of time derivatives of changes in the measured meteorological element. In the case of the barograph and pluviograph this is achieved by means of capillary tubes connected with an air or water reservoir, respectively. The thermograph consists of a metal ball connected with the measured medium through a metal rod. The author develops the differential equations on which the time-rate readings are based. *Subject Headings:* **1. Differential recorders 2. Thermographs 3. Barographs 4. Pluviographs.**—*G.T.*

5.4–51 551.508.2:535.339

Hinzpeter, Hans, **Über die Durchlässigkeit der Potsdamer Normalfilter.** [The transmissibility of the Potsdam normal filters.] *Zeitschrift für Meteorologie*, 7(5):150–152, May **1953.** table. **MH-BH**—Filter thickness of 1.5 mm and 2.4 mm were provided for the Schott filters RG2 and OG1 in 1937 for the radiation network in central and south Europe. In this paper the author reports the transmissibility of the Potsdam normal filter. Measurements were made in parallel light of an Osram-band lamp in front of entrance slit of a Zeiss-mirror monochromator. SCHÜEPP's method for determining filter radiation factors is discussed with particular reference to the above mentioned filter thickness. *Subject Headings:* **1. Light measurement 2. Light filters.**—*I.L.D.*

5.4–52 551.508.2

Takasu, K., **A new device of removal of radiation error upon the thermojunction for microclimatic use.** *Journal of Agricultural Meteorology*, Tokyo, 7(3/4):119–120, Nov. **1952.** 2 figs., 6 refs. In Japanese; English summary p. 120. **MH-BH**—A compensated thermojunction to remove the radiation error due to direct solar radiation without using a shield over the measuring portion in the case of microclimatic temperature measurement is described. In addition to the usual measuring element and cold element, other compensating elements are employed. *Subject Headings:* **1. Micrometeorological instruments 2. Temperature instruments.**—*From author's abstract.*

5.4–53 551.508.21

Blackwell, M. J., **On the development of an improved Robitzsch type actinometer.** *Great Britain. Meteorological Research Committee, M.R.P.* 791, March 24, **1953.** 6 p. 10 figs., 7 refs. Mimeo. **GB-MO**—Six recorders of Fuess-Robitzsch type built in London were tested; defects found included marked variations of sensitivity with solar elevation. Modifications were introduced at Kew to remove defects and the Mk II recorder was completed in May 1951. After further tests an improved Mk III was completed in 1952. A photo is shown, performance and routine calibrations are described. *Subject Heading:* **1. Actinometers.**—*C.E.P.B.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Numerical prediction formula of 500 mb** (Gabites), 5.4–96.

5.4–54 551.509.1:621.394

Wingfield, W. M. and Rayfield, F. A., **Performance tests of Muirhead meteorological facsimile.** *Canada. Meteorological Div., Circular* 2311, FAX-1, June 11, **1953.** 24 p. Attached: Muirhead and Co., Ltd., **D-658 18″ Mufax chart transmitter; D-649 18″ Mufax chart**

recorder; Mufax 18″ chart recorders for unattended operation D-649-E & D-649-G. *Muirhead & Co., Beckenham, Eng., Publications,* 8691-C; 8696-C, Dec. **1952**; 8691-A/1, [n.d.]. **DWB**—The establishment of a nation-wide weather facsimile system in Canada planned for 1953 is announced. The Mufax chart transmitter (D-658) and recorder (D-649) are described in the circular and the attached pamphlets. The apparatus is designed to transmit directly (over radio or wire) weather charts measuring 18×22″, and to record them on a radio-sensitive paper. Performance test data (density value, contrast range, color sensitivity, resolving power, dimensional stability of paper) are presented. *Subject Headings:* **1. Facsimile map transmission 2. Canadian weather service.**—*G.T.*

5.4–55 551.509.2/3:159.95

Di Benedetto, Felice, **Critica obiettiva della meteorologia sinottica come scienza e come arte.** [Objective critique of synoptic meteorology as a science and as an art.] *Rivista di Meteorologia Aeronautica,* 12(4):31–34, Oct./Dec. **1952.** Italian, French, English and German summaries p. 31. **MH-BH**—Synoptic meteorology is classified as an individualistic science on the basis of GALILEO's definition of science and of the modern concept of science. Synoptic meteorology is also considered as an art according to its traditional definition. General differential criteria are given so as to distinguish the scientific from the artistic activity of the mind. This study reveals the fundamental importance of the intuitive-sensorial activity of the practical meteorologist, which has been frequently misinterpreted and unjustly excluded from the dominion of science. *Subject Headings:* **1. Synoptic meteorology 2. Philosophy of forcasting.**—*Author's abstract.*

5.4–56 551.509.2:656.6(262)

France. Météorologie Nationale, **Protection météorologique des ports et des navires (Bassin Méditérranéen Occidental).** [Meteorological protection of ports and shipping in the Western Mediterranean.] *France. Météorologie Nationale. Délégation Générale en Afrique du Nord, No.* 90/AFN/EX, Jan. 8, **1953.** 20 p. 3 maps. Mimeog. **DWB**—Pt. I describes the classification of maritime meteorological bulletins, Pt. II gives a division of the western Mediterranean Sea into regions and zones (charts) and Pt. III explains the distribution of current weather information. *Subject Headings:* **1. Marine weather services 2. Western Mediterranean Sea 3. France.**—*A.A.*

5.4–57 551.509.3:551.515.8:551.589.5

§Great Britain. Naval Weather Service, **Multiple frontal analysis.** *Great Britain. Naval Weather Service, Memo:* No. 144/50, April **1950.** 4 p. 19 figs. Mimeo. **GB-MO**—Frontal structure is much more complex than was formerly thought. An example of a triple front over Britain and E. Atlantic on June 12, 1949, is examined in detail with aid of wet bulb potential temperatures. Illustrations include analyzed surface charts, tephigrams, time graphs of frontal heights shown by W B P Ts, and hourly data. Such detailed analysis allows greater precision in forecasting flying conditions, especially icing. *Subject Headings:* **1. Frontal structure 2. Air mass characteristics.**—*C.E.P.B.*

5.4–58 551.509.312

Ozorai, Zoltán, **Néhány szó az izallobárok megrajzolásáról.** [A few suggestions for drawing isallobars.] *Időjárás,* 56(1/4):67–70, Jan./April **1952.** 3 figs. **DLC**—In drawing isallobars the difficulties most frequently encountered are: 1) paucity of data and 2) incorrect data. The author discusses these two sources of error and suggests the following rules: (1) when data are scarce isallobars should not be drawn without considering the circulation. Only those areas should be marked with identical isallobars over which the direction of circulation is the same. (2) Opposite signs of pressure tendency can usually be traced back to erroneous data if they occur in areas having identical circulation, unless they are also accompanied by a sudden wind shift. In this latter case the existence of a front may be assumed. *Subject Heading:* **1. Isallobars.**—*G.T.*

5.4–59 551.509.317

§Saito, Naosuke (*Niigata Met. Obs.*), **An aerological study of the cold vortex and stationary front in summer in the Far East.** *Meteorological Society of Japan, Journal,* 31(2):51–59,

Feb. 1953. 6 figs., 10 refs., 8 eqs. **MH-BH**—The weather and circulation in the Far East is analyzed on the basis of surface and upper air charts for the end of July and the first week of Aug. 1952. A stationary frontal zone stagnating along the south coast of Japan associated with a cut-off cold vortex over Manchuria, and with a steady jet stream surrounded by inverse meridional circulation dominated the synoptic pattern, causing rain on an abnormally large number of days. *Subject Headings:* **1. Synoptic aerological studies 2. Synoptic studies 3. Synoptic charts 4. Far East.**—*G.T.*

5.4–60 551.509.317:551.513.1

*Wolff, Paul M. (*U. S. Bur. of Aeronautics Project AROWA*), **Preliminary report on a statistical study of blocking patterns at the 500 millibar level.** (In: U. S. Navy. Fleet Weather Central, **Some recent developments in synoptic meteorology.** Aug. **1952.** Section 9, 6 p. 1 graph, 2 tables, ref.) **DWB**—Cases studied were from Oct. 1945–Sept. 1947 and Jan. 1949–Dec. 1950 Northern Hemisphere Historical 500 mb charts. Blocks were noted on 1250 maps, and were tabulated by longitude and duration. A strong preference is shown for west coasts of continents and minimum occurrence along east coasts; regardless of duration. Longer duration blocks vary greatly in frequency from year to year. *Subject Headings:* **1. Blocking action 2. Forecasting 500 mb trough movement.**—*M.R.*

5.4–61 551.509.318

Blue Hill. Meteorological Observatory, **Semi-annual progress report, 1951–52, to the United States Weather Bureau on Contract CWB-8163.** June 20, **1952.** 20 p. fig., ref. Typescript. **DWB**—Report consists of an account of the detailed study of a Type-6 storm (characterized by an open wave which travels in a general northeasterly direction while pressure remains high on the N–NW–W of southern New England). Charts and data analyzed are listed. Main features of the storm including fronts, air masses, large and small scale developments and distribution and total amounts of precipitation are discussed and tabulated for purpose of comparison with corresponding data from a Type-4 storm studied under the same contract in 1950–51. "Application of J. J. GEORGE's method of forecasting storm direction and speed" (*see item* 3E–201 in May 1952, *MAB*) to Type-6 storms appears promising. Report closes with a list of suggested improvements for the 1941–50 volume of World Weather Records and a brief summary of the proposed program for the remainder of the year. *Subject Headings:* **1. Weather types 2. Objective forecasting 3. New England. I. Contract CWB-8163 II. Conover, John H. III. Brooks, Charles F.**—*M.P.K.*

5.4–62 551.509.318:551.515.8

Čadež, M., **O tipovima vremena.** [Weather types.] *Yugoslavia. Hidrometeorološka Služba. Hidrometeorološki Glasnik*, 2(1–2):88–96, **1949.** 4 figs., 3 refs. In Croatian; Russian and French summaries, p. 96. **DWB**—Physical definitions of various weather types are based on the horizontal and vertical movement of air masses. Four main types (cyclonic, advective, anticyclonic and convective) and their combinations are discussed. Symbols used on charts to indicate prevailing weather types are presented and their quantitative application explained. Synoptic aspects of various weather types are described. *Subject Headings:* **1. Weather types 2. Air mass movements 3. Yugoslavia.**—*G.T.*

5.4–63 551.509.318

Faust, Heinrich, **Die mitteleuropäischen Grosswetterlagen bei Existenz eines Azorentiefs.** [The Central European general weather type during an Azores low.] *Meteorologische Rundschau*, 6(7/8):143–145, July/Aug. **1953.** 5 tables, 3 refs. **DWB**—This statistical summary gives frequency (actual and %) of occurrence of Azores low for each of 15 general weather types over central Europe. Depth and development of low are also tabulated and the results are set out in 6 forecasting rules. *Subject Headings:* **1. Weather types 2. Europe.**—*C.E.P.B.*

5.4–64 551.509.218:598.2

Hay, R. F. M., **Bird migration through Great Britain in different synoptic situations.** *Meteorological Magazine*, London, 82(972):184–185, June **1953. MH-BH**—Summary of paper by K. WILLIAMSON on "The nature of spring and autumn passage migration through

Britain" based on observations at Fair Isle in 1951. Comparisons with synoptic charts showed that migration is stimulated by lack of wind (anticyclones and weak gradients) and that drift-migrants flew with the wind. *Subject Headings:* **1. Weather types 2. Bird migration. I. Williamson, K.**—*C.E.P.B.*

5.4–65 551.509.318

Heyer, Ernst, **Über den Eintritt einer Ostwetterlage in Mitteleuropa.** [The appearance of an east weather situation in Middle Europe.] *Zeitschrift für Meteorologie*, 6(12):379–381, Dec. **1952.** 4 figs. **MH-BH**—With the aid of synoptic charts and a detailed description of the atmospheric pressure changes and circulation the author describes the rapid transformation of a weather situation characterized by intense flow of warm west European air eastwards, into an east weather situation with rapid flow of cold air westwards. The most important factor leading to this transformation is the intensification of the Asiatic-European high by the penetration of cold air aloft. Signs for forecasting the transformation into an east weather situation in central Europe are discussed. *Subject Headings:* **1. Weather forecasting 2. Atmospheric circulation 3. Central Europe.**—*I.L.D.*

5.4–66 551.509.318

Lecce, B. and Urbani, M., **Premessa e considerazioni sullo studio dei tipi di tempo.** [Premises and considerations on the study of weather types.] *Rivista di Meteorologia Aeronautica*, 12(2):3–8, April/June **1952.** 2 eqs. Italian, French, English and German summaries p. 3. **MH-BH**—After an objective appreciation of the methods now in use for interpretation and forecast of weather phenomena, the value and necessity of statistical meteorology are emphasized. The basic principles followed in the retrospective analysis of weather types, now being carried out at the Forecast Section of "Ispettorato Telecomunicazioni e Assistenza al Volo" are then expounded, and a few examples of results from preliminary studies are given. *Subject Heading:* **1. Weather types.**—*Authors' abstract.*

5.4–67 551.509.318

§*Lindquist, H. D. (*U. S. W. B., Seattle, Wash.*), **Study of summertime stratus and fog in Western Washington.** April **1953.** 5 p. 13 figs., 2 refs. Mimeo. **DWB**—Objective forecasting studies of stratus in the Puget Sound area by KINZEBACH and BARTLETT (1951) based on pressure gradient from Seattle–North Bend, Wash., were tested during the summer of 1952 by the fire weather and aviation forecasters in Western Washington and found very helpful in improving forecasts of duration and extent of summer stratus. Refinements are reported in the present paper, resulting from statistical study of frequency, extent and duration of stratus and classification of cases in July–Aug. 1949–52 based on such statistics. Besides testing different horizontal pressure gradient parameters, the dew point, surface wind direction and speed, sky conditions at several coastal and inland stations, temperature difference between coast and Puget Sound, etc., were tested and lines drawn on scatter diagrams to show efficiency of parameter in segregating fog or stratus from nonfog or stratus situations. Pressure gradient, wind direction and dew point are the three most effective parameters, it was found. *Subject Headings:* **1. Objective forecasting 2. Stratus forecasting 3. Western Washington.**—*M.R.*

5.4–68 551.509.318:551.583.1

Péczely, György, **A tél és a nyár időjárási típusaiban mutatkozó szakaszosságok.** [Periodicities of weather types in winter and summer.] *Időjárás*, 57(2):98–102, March/April **1953.** fig., tables. Russian and French summaries p. 98. **DLC**—Pressure and temperature anomalies with positive or negative signs may be combined into four types of pressure/temperature anomalies (p+, t−; p+t+; p−t+; p−t−). Each of these types represents the predominance of one of the three action centers (Icelandic, Asiatic, Azores) affecting the synoptic pattern of Hungary. The correlation between pressure/temperature anomaly and air-mass type (the correlation in winter is different from that in summer) provides a means of deducing frequency and duration of prevailing air masses from anomaly types when synoptic charts are not available. This is done for Budapest from records covering the period 1810–1952. A periodogram analysis reveals periodicities of 12–18 years for the different anomaly types. *Subject Headings:* **1. Weather types 2. Periodicities.**—*G.T.*

5.4–69 551.509.318:551.579.4

*Serra, Antonio, **Le situazioni meteorologiche collegate all'alluvione dell'ottobre 1941 nell'isola di Sardegna.** [The meteorological situation connected with the flood of October 1951 in Sardinia.] *Rivista di Meteorologia Aeronautica*, 12(4):3–17, Oct./Dec. **1952.** 3 figs., 3 tables, 31 refs. Italian, French, English and German summaries p. 3. **MH-BH**—Data on average precipitation and on monthly variations of precipitation are presented for several stations in Sardinia. The synoptic situation connected with the flood of Oct. 14–19, 1951 is analyzed in detail. Surface and 500 mb pressure charts are presented for each of the six days. *Subject Headings:* **1. Synoptic studies 2. Floods 3. Sardinia.**—*G.T.*

5.4–70 551.509.318:551.589

Woodbridge, David D. and Decker, Fred W. (*Oregon St. Coll., Corvalis*), **Weather-typing applied to summer frontal-rains in Oregon.** *American Meteorological Society, Bulletin*, 34(1):28–37, Jan. **1953.** figs., table, 5 refs. **MH-BH**—Thirteen weather types were adopted, classified mainly according to the location of the 1020 mb isobar of the North Pacific high. Schematic charts with detailed description of weather processes presented, giving also the probability of precipitation in three climatological areas of Oregon and percentages of dry fronts for each weather type. *Subject Headings:* **1. Weather types 2. Dynamic climatology 3. Frontal type precipitation 4. Oregon.**—*A.A.*

CLOUD SEEDING AND ARTIFICIAL PRECIPITATION

5.4–71 551.509.67

Israel. Rainfall Research Committee, **Symposium on artificial rain.** Hakirya, Aug. **1951.** 80 p. figs., refs. In Hebrew; English summaries. **DWB**—A collection of papers presented at the first scientific meeting held under the sponsorship of the Rainfall Research Committee after the first year's efforts (April 16–17, 1950), in an attempt to review progress and define problems slated to be solved. Separate articles by KACHALSKY, STEINITY, H. and T. NEUMANN, BITRON, ZAHAVY and KROWN are abstracted separately. They deal with cloud physics, use of AgI, radar, aerosols, etc. The forward was written by Y. CARMON, head of the Rainfall Research Committee. *Subject Headings:* **1. Artificial precipitation 2. Symposia 3. Israel. I. Zahavy, D.** (*ed.*) **II. Carmon, Y.**—*M.R.*

5.4–72 551.509.67:551.574.1:551.577.11

Mason, B. J., **The natural and artificial production of rain.** *Royal College of Science, Scientific Journal*, v. 22, **1953.** 14 p. 5 figs. Abstracted from reprint. **DWB**—General lecture on processes of cloud formation, mechanisms of precipitation release (coalescence, ice crystal). Precipitation mechanisms are shown in diagram form. Techniques of rain making are set out, and it is concluded that it is often possible to release some precipitation from suitable clouds by seeding, causing local changes in distribution but not in the general level of rainfall. *Subject Headings:* **1. Cloud seeding 2. Precipitation formation.**—*C.E.P.B.*

5.4–73 551.509.67

New Mexico Institute of Mining and Technology. Research and Development Div., Socorro, N. M., **Water resources development.** Final Research Report. **1953. DWB**—Contains the following papers: Sec. I: William Hume, II, "Induced precipitation" (44 p. 4 figs., 8 plates, 2 tables, refs.). Starting with an outline on the physics of precipitation the author describes the research activities of the project. A "cloud census" of New Mexico clouds was attempted and the effects of environment on sublimation nuclei, as well as the growth of ice crystals studied. The practical use of silver iodide generators and balloons with dry ice is described. Summer and winter seeding operations are summarized. Sec. II: C. R. Holmes, "Report on the investigation of ground water problem" (15 p. 4 figs., 8 refs.). Appends. A, B, C: (*see items*, 3.5–96, May 1952; 2.9–120, Sept. 1951; 4.3–193, March 1953; 3.9–181, Sept. 1952, *MAB*, respectively). Append. D: R. R. Braham, Jr., "Climatic aspects of winter precipitation in New Mexico" (6 p. 6 figs.). Author presents charts for the seasonal distribution of precipitation, percentage of winter precipitation, annual snowfall, month of maximum snowfall, number of days with precipitation from Dec. through March. Synoptic

conditions associated with winter precipitation in New Mexico are described and the variabilit of winter precipitation over the North Rio Grande watershed shown graphically. Append. E E. J. Workman, "Some observations bearing on the physical basis for cloud seeding." "Natur and the question of rainmaking." "Possible role of residual atmospheric ice in middle latitud precipitation" (26 p. 4 figs.). Three papers presented at meetings. In the first paper, th author points out that a synoptic analysis is not sufficient in order to determine the possibilit of precipitation and gives an outline of the physical processes involved. A statistical analysi of laboratory experiments shows that the number of nuclei per m^3 increases with decreasin temperature and perhaps has a maximum between −26 and −27°C. Radar returns fron cloud tops start at −16°C according to 80 samples. The second paper deals with climati fluctuations (El Paso, 1911–1950), seasonal variability of rainfall, and gives a general outlin of cloud seeding problems. A statistical probability study of precipitation from clouds wit different top heights is presented (400 cases). Almost no precipitation if top is under 22,00 ft. The third paper emphasizes the nucleation by ice particles. *Subject Headings:* **1. Artificia precipitation 2. Cloud seeding 3. Cloud physics 4. Climate of New Mexico 5. Ne Mexico. I. Hume, William, II II. Holmes, C. R. III. Braham, R. R., Jr. IV. Workman E. J. V. New Mexico Economic Development Commission.**—*A.A.*

5.4–74 551.509.6

*North American Weather Consultants, Pasadena, Calif., **Report on cloud seeding opera tions in Santa Barbara County, Nov. 1951–May 1952. Prepared for the County of Sant Barbara.** *North American Weather Consultants, Report* 6-6, Aug. **1952.** 19 p. 36 figs tables, refs. **DWB**—Precipitation during 6 months of cloud seeding operations (over 100 hours) was up to 320% above normal and 27% in excess of "natural" precipitation compute by means of an unaffected control area. The percentage of normal monthly and seasona values of normal storms is shown on maps, meteorological storm analyses are made, an scatter diagrams compare target and control area precipitation. Cloud seeding was made b both ground and airplane generators. *Subject Headings:* **1. Cloud seeding experimen 2. Precipitation distribution 3. Santa Barbara County, California.**—*A.A.*

5.4–75 551.509.6

Pellisari, L., **La protezione antigrandine in Italia.** [Hail prevention in Italy.] *Rivis di Meteorologia Aeronautica*, 13(1):52–53, Jan./March **1953. MH-BH**—Hail preventic activities in Italy by means of rockets are reviewed. In 1952 they show considerable territori expansion over previous years (the program was initiated in 1949). Out of 355 predicte hailstorms against which action was taken, only 32 developed despite intervention, while a the others subsided. Even in the 32 negative cases failure was mostly due to reparable shor comings. Rockets reaching higher altitudes (1,500 m) were introduced at several location their large-scale use will eliminate one of the major sources of failure. *Subject Heading* **1. Hail prevention 2. Italy.**—*G.T.*

5.4–76 551.509.6

Summerset, John and Smith, T. B., **Discussion of "Some evaluations of sustained clou seeding operations" by I. P. Krick and T. B. Smith.** *American Geophysical Union, Tran actions*, 34(1):137–140, Feb. **1953.** figs., tables. **MH-BH**—(*See item* 4.1–71, Jan. 195 *MAB.*) SUMMERSET compares rainfall over target area with unseeded areas immediate to the north and south and finds that "there is absolutely no indication of an effect due seeding." SMITH agrees that cloud seeding is not effective enough in producing the percenta increases which are necessary to prove the effectiveness by the suggested statistical metho but states that one of SUMMERSET's control areas believed to be unseeded, was actually seede *Subject Headings:* **1. Cloud seeding 2. Cloud seeding evaluation.**—*A.A.*

5.4–77 551.509.

U. S. Weather Bureau, **Tentative plans for Weather Bureau artificial cloud nucleati (ACN) project.** Wash., D. C., Nov. **1952.** 18 p. diagr. Mimeo. **DWB**—An elabora plan for testing the effectiveness of cloud seeding by dry ice and silver iodide in the sout western part of Washington State and Northwestern Oregon is described. The Weath

ureau expects to conduct these experiments with the help of the Navy, Signal Corps, NACA, AA and the Air Navigation Development Board. Cloud drop spectra, temperature, liquid ater content and ice crystal content of clouds and other data necessary to a study of the hysics of rain formation will be obtained from the air. A fixed network of rain gage stations ill be used for each trial, and control days and control areas will be set aside for statistical valuation. *Subject Headings:* **1. Cloud seeding experiments 2. Cloud seeding evaluation . Western Washington 4. Northwestern Oregon.**—*M.R.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

STRUCTURE OF THE ATMOSPHERE

See also: **Vertical structure of atmos.** (Roulleau, Trochon), 5.4–3; **Rockets in upper atmos. research** (Van Allen), 5.4–4; **Air pollution and London fog** (Wilkins), 5.4–185; **Molecular nitrogen fixation and nitrogen cycle in nature** (Virtanen), 5.4–197.

5.4–78 551.510.41

Goody, R. M. and Walshaw, C. D., **The origin of atmospheric nitrous oxide.** *Royal Meteorological Society, Quarterly Journal*, 79(342):496–500, Oct. **1953.** table, 12 refs. **DWB**—irplane and ground records of the 7.8μ band of N_2O in the solar spectrum are consistent with mean of 3.5×10^{-7} by volume, substantially constant up to 10 km. Theoretical considera-ons indicate a constant fraction up to 40 km and photochemical destruction in a vertical olumn as 10^{11} molecules/cm²/sec. This loss is compared with emission due to bacterial eactions in the soil, estimated as 8×10^{10} mol/cm²/sec. Reaction of N_2 and O_3 can only rovide about one-fortieth. *Subject Headings:* **1. Atmospheric composition 2. Nitrous oxide.** —*C.E.P.B.*

5.4–79 551.510.41:535.62

Krivoruchko, F. D., **Opredelenie khlora v atmosfernom vozdukhe.** [Determination chlorine content in the air.] *Gigiena i Sanitariia*, Moscow, 3:53–54, March **1953. DLC**—new colorimetric method of determining the chlorine content of air based on changes of olor intensity of acidified solutions of methyl orange (MENSHIKOV's procedure) is presented nd described. Experiments made with various concentrations of calcium hypochlorite and ethyl orange solutions have shown that the sensitivity of the method increases with the ecrease of methyl orange concentration; that the concentration of acidified methyl orange olutions containing .0003–.03 mg of chlorine comply with Lambert-Baer's law and that the otimum volume of pH is 3. The method makes it possible to determine the ultimate ermissible concentration of chlorine in the air in 10 minutes. *Subject Headings:* **1. Atmospheric composition 2. Chlorine content measurement 3. Colorimetry.**—*A.M.P.*

5.4–80 551.510.41

*Kulp, J. Laurence, **Natural radiocarbon 14 measurement and applications.** Columbia niv. Lamont Geological Observatory, Contract AF 19(122)-214, Quarterly Progress eports, Nos. 9/11; 13/14, Jan. 15; Sept. 15, **1953.** 2 pieces. tables. **DWB**—Preliminary ata given in tables on the C^{11} concentration in atmospheric CO_2 over land and ocean areas the North American continent show: 1) that the C^{11} concentration appears to vary over a nge of 10%; 2) it is roughly constant in atmospheric CO_2 (about 5.8 cpm); 3) less than that r recent wood under the same conditions (about 6.7 cpm); 4) at the altitude of maximum ^{11} production (40–50,000 ft) there is no large increase in the concentration. Author lists x of his papers, four of which have been recently published and two will be published shortly. *ubject Headings:* **1. Radiocarbon concentration 2. Upper atmosphere. I. Columbia University. Lamont Geological Observatory II. Contract AF 19(122)-214.**—*W.N.*

5.4–81 551.510.41:581.03:581.056

†Nash, Leonard Kollender (*Harvard Univ.*), **Plants and the atmosphere.** Cambridge, arvard University Press, **1952.** 122 p. 7 figs., bibliog. p. 121–122. *Harvard Case Histories Experimental Science*, Case No. 5. **DWB**—A substantial treatise covering the history of

the subject of plants and their use of atmospheric oxygen, CO_2, solar radiation, water, etc. and their contribution to the atmosphere. The sources date from 1648 (VAN HELMONT) and 1661 (BOYLE), to LAVOISIER, PRIESTLEY, INGEN-HOUSZ, SENEBIER in the 1790's and DE SAUSSURE (1804). The most important contributions of these authors to progress in this field are quoted verbatim (or in translation). *Subject Headings:* **1. Vegetation influences 2. Atmospheric composition.**—*M.R.*

5.4–82 551.510.41:551.510.53 545:546.2

Paneth, F. A., **The micro-analysis of the inert gases.** *Endeavour*, 12(45):5–17, Jan **1953.** 7 figs., 51 refs. **MH-BH**—This article describes modern methods of analyzing very tiny quantities of the inert gases and the discoveries made as a result. In 1936, for example they made possible the first isolation of a synthetic element—helium—in measurable quantity Micro-methods have also been used for identifying the radioactive isotopes of xenon and krypton resulting from uranium fission, for estimating the age of iron meteorites, and for investigating changes in the composition of the stratosphere. *Subject Headings:* **1. Micro analysis of gases 2. Inert gases 3. Stratospheric composition.**—*Author's abstract.*

5.4–83 551.510.42:616.

Air pollution and bronchitis. *Smokeless Air*, No. 87:15–16, Autumn **1953.** map. **DWI** —Summary of part of "Chronic bronchitis: an introductory examination of existing data by N. GOODMAN, R. E. LANE and S. B. RAMPLING in *British Medical Journal*, Aug. 1, 1953 The death rate from bronchitis in England is plotted and found to agree closely with pollution map by C. E. P. BROOKS. *Subject Headings:* **1. Atmospheric pollution 2. Bronchitis I. Goodman, N. II. Lane, R. E. III. Rampling, S. B.**—*C.E.P.B.*

5.4–84 551.510.42:614.7

American Society of Heating and Ventilating Engineers, St. Louis, Mo., 58th annua meeting, Jan. 1952. **The industrial atmosphere—a symposium. Pt. 1.** *Heating, Pipin and Air Conditioning*, 24(4):127–132; April 1952; Pt. 2, *ibid.*, 24(5):122–129, May **1952** 4 figs., 2 tables, 5 portraits. **DWB**—The four papers included in this symposium are: 1) "In tegration of process and human requirements," by H. A. MOSHER (mainly dealing with th statistical aspect of air pollution). 2) "Effect of atmospheric requirements on industria architecture and plant layout," by A. T. WAIDELICH and W. A. HUNTING. 3) "Effects o industrial atmosphere on workmen and on community," by ROBERT A. KEHOE. 4) "Equip ment for industrial ventilation and air pollution control," by R. P. WARREN. Author portraits and brief curricula vitae are attached. A discussion on the symposium includin comments of panel members is appended (p. 127–129, May issue). *Subject Headings:* **1. At mospheric pollution control 2. Industrial climatology 3. Industrial hygiene 4. Symposi I. Mosher, H. A. II. Waidelich, A. T. III. Hurting, W. A. IV. Kehoe, Robert A. V. Wa ren, R. P.**—*G.T.*

5.4–85 551.510.42:551.556.4:551.21(72

Brown, William F. (*U. S. W. Bur., Airport Sta., Miami, Fla.*), **Volcanic ash over th Caribbean, June 1951.** *Monthly Weather Review*, 80(4):59–62, April **1952.** 2 figs. **MH-B** —Haze reported by aircraft up to 14,000 ft elevation over the Caribbean Sea is attributed to volcanic eruption on Fogo Island in the Cape Verde Group on June 12, 1951. Cloud colum was reported to reach 25,000 ft with ashes falling on Fogo and Bravo Islands. Activi decreased on June 17, increased again June 26 (cloud to 12,000 ft) then subsided. Spread the haze is indicated by daily charts and isochrones from (June 15–26). Lines on chart show 700 and 850 mb contours and 10,000 and 5,000 ft winds over area. *Subject Heading* **1. Volcanic dust 2. Haze layers aloft 3. Fogo eruption (June 1951) 4. Caribbean Area.** *M.R.*

5.4–86 551.510.42:551.524

*DallaValle, Joseph Marius; Orr, Clyde, Jr. and Blocker, H. C. (*Georgia Inst. of Techn* **Settling of particles in a thermal gradient.** [1951?] 15 p. 12 figs., 2 tables. Typescrip **DWB**—The results of 8 sets of settling rate data obtained in vertical brass and glass settli

columns with steep temperature gradients (also with inversion conditions) are presented in tables and settling rate curves, and are discussed. Magnesium carbonate was used as the aerosol, but the results are applicable to settling of airborne dust, smoke or mist in the free air or an enclosure. It is thought that aggregation caused by thermal turbulence or effects of thermal repulsion may account for settling rates which do not conform with Stokes' equation for rate of fall. The latter applies only in quiet air with uniform temperature. *Subject Headings:* **1. Particle settling rate 2. Temperature gradient.**—*M.R.*

UPPER ATMOSPHERE—IONOSPHERE

5.4–87 551.510.534

Paetzold, H. K., **Die atmosphärische Ozonschicht und ihre vertikale Verteilung.** [The atmospheric ozone layer and its vertical distribution.] *Umschau*, 53(23):715–717, Dec. 1, **1953.** 4 figs. **DWB**—The reactions between O molecules and UV light resulting in formation and destruction of ozone are set out; these give maximum O_3 at about 23 km. Recent upper air measurements are described and their results discussed. In spring there is a second maximum at 10-16 km; due to transport from a polar reservoir. Conditions on Mars are compared. *Subject Heading:* **1. Vertical ozone distribution.**—*C.E.P.B.*

5.4–88 551.510.535:551.594.7

Chappell, D. W. G., Hainsworth, L. B. and Moorat, I. K., **Some statistical results on the phenomena associated with ionospheric storms.** *Journal of Atmospheric and Terrestrial Physics*, 3(6):301–320, July **1953.** 13 figs., 14 refs. **MH-BH**—A statistical examination is made of abnormalities in critical frequency and height of maximum ionization of F_2 and absorption in lower layers, in relation to sunspots, M-regions and flares, using data for Slough 1941–49. "It is concluded that, except for storms associated with M-regions at sunspot minimum, the probability that any day will be a storm day, assessed on changes in f_0F_2, does not exceed 0.5 for the first day of a storm but may reach 0.7 on subsequent days." *Subject Headings:* **1. Ionospheric storms 2. Ionospheric reflection.**—*C.E.P.B.*

5.4–89 551.510.535

Characteristics of the ionosphere in Great Britain. *Nature*, London, 172(4379):617, Oct. 3, **1953. DWB**—Note on: "Characteristics of the ionosphere observed in Great Britain during 1930–1946." *Gr. Britain. Dept. of Scientific and Industrial Research, Special Report*, No. 23, 1953. 16+p. *Subject Heading:* **1. Ionospheric research.**—*C.E.P.B.*

5.4–90 551.510.535:551.594:621.396

Crompton, R. W., Huxley, L. G. H. and Sutton, D. J., **Experimental studies of the motions of slow electrons in air with application to the ionosphere.** *Royal Society of London, Proceedings, Ser. A*, 218(1135):507–519, July 23, **1953.** 7 figs., 3 tables, 14 refs. 30 eqs. Also: Huxley, L. G. H., **Alternative developments of the theory of radio wave interaction.** *Ibid.*, p. 520–536. 3 figs., 2 tables, 13 refs., 56 eqs. **DLC**—Empirical formulas are found for drift velocity, collision frequency, electronic temperature and mean energy loss per collision. Collision frequency can be related to pressure (p mb) by $\nu = 7.02 \times 10^7$ p. The average energy lost in a collision is computed and applied to radio-wave interaction. It is found that the theory of this interaction requires revision, and an alternative theory is given in the second paper. *Subject Headings:* **1. Ionospheric physics 2. Radio wave propagation.**—*C.E.P.B.*

5.4–91 551.510.535

Ellis, G. R., **F-Region triple splitting.** *Journal of Atmospheric and Terrestrial Physics*, 3(5):263–269, June **1953.** 7 figs., 2 tables, 8 refs. **MH-BH**—Measurements of the direction of arrival of Z echoes have been made at Hobart, Tasmania. The results indicate that F-region triple splitting is caused by back scattering from a rough layer. The directions observed are consistent with the assumption that reflection at the Z level occurs when the angle of incidence is such that the wave normal becomes parallel to the geomagnetic field at the ordinary level of reflection. *Subject Heading:* **1. F layers.**—*Author's abstract.*

5.4–92 551.510.535

Johnson, M. H. (*Naval Res. Lab.; Wash., D. C.*), **Diffusion processes in the ionosphere.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 11:111–123, **1952.** 4 figs., 4 refs., 13 eqs. **DWB**—HULBURT's and author's investigations on the problem are discussed. Two major theoretical questions are dealt with: 1) How do ions diffuse in a gravitational and magnetic field? Contrary to the view that ions are trapped, it is found that ions diffuse downward in much the same way regardless of the existence of a horizontal magnetic field. 2) What phenomena show influences of diffusion? Interpreting certain ionospheric data at the geomagnetic equator in terms of the downward diffusion of ions under gravity, it is found that the scale height above 250 km is about 120 km and that the molecular density at 250 km is approximately $2\times10^9/cm^3$. There is a marked change in the characteristics of the atmosphere between 200 and 250 km. *Subject Headings:* **1. Ionospheric diffusion 2. Magnetic fields 3. Gravity effects.**—*W.N.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Blocking action in westerlies** (Berg), 5.4–103; **Laminar-turbulent transition in boundary layer** (Emmons), 5.4–151.

5.4–93 551.511

Carlin, Albert V. (*U.S.W.B.*), **Case study of the dispersion of energy in planetary waves.** [1952.] 10 p. 6 figs., 3 tables, 8 refs. Photostat of typescript. **DWB**—A clear cut case of dispersion of energy downstream in the mid-tropospheric long-wave pattern during the first two weeks of November 1951 is examined with the help of plots of meridional wind components. The dispersion could be traced over more than half the hemisphere travelling with a speed about twice that of the zonal wind at 700-millibars. Calculations of group velocity based on ROSSBY's work show good agreement with observed values of the speed of dispersion. *Subject Heading:* **1. Energy dispersion.**—*Author's abstract.*

5.4–94 551.511:551.554

Diubiuk, A. F., **Izmenenie skorosti vetra s vysotoĭ.** [Change of wind velocity with height.] *Leningrad. Tsentral'nyĭ Institut Prognozov, Trudy*, 15(42):3–21, **1949.** 39 eqs. **DLC**—Equations of motion integrated assuming that internal friction is constant with height. Solutions given for the following cases in Descartes coordinates: 1) pressure gradient forces variable with height; 2) gradient constant with height, but variable in time; 3) gradient function of height and time—solutions in form of a Taylor series. Solutions for steady and unsteady cases are given also in spherical coordinates. *Subject Headings:* **1. Ekman's spiral 2. Friction layer 3. Wind profile theory 4. Equations of motion.**—*A.A.*

5.4–95 551.511

Duun-Christensen, J. T., **Modellversuche über Konvektionsströmung.** [Model experiments on convection currents.] *Annalen der Meteorologie*, 5(7–12):373–377, **1952.** 8 figs. **MH-BH**—A narrow glass chamber with a small electric heater immersed in water was arranged to show 2-dimensional convective circulation and temperature field. Results are shown in photos. A narrow vertical current developed widening upwards. On its lower half a nearly horizontal circulation developed. Both were nearly independent of shape of bottom surface. *Subject Headings:* **1. Convection currents 2. Laboratory models.**—*C.E.P.B.*

5.4–96 551.511:551.509.312

Gabites, J. F., **Tests of a numerical prediction formula of 500 millibar height profiles.** *New Zealand. Meteorological Office, Technical Note*, No. 91, June 9, **1952.** 4 p. table, chart, 10 refs. **DWB**—A series of progressively more complicated atmospheric models suitable for numerical prediction is being devised by CHARNEY and collaborators. The prediction formula based on the early one dimensional model may be used without computing machines and has been tested with moderate success on a series of Southwest Pacific charts for the pre-

diction of the 500 millibar height profile along latitude 40°S. *Subject Headings:* **1. Atmospheric models 2. Numerical forecasting.**—*Author's abstract.*

5.4–97 551.511:551.553

James, R. W., **Why aren't our heads blown off?** *Science News*, 30:33–42, **1953. GB-MO**—A lucid discussion of reasons why, even in the upper air, winds never have the speed appropriate to motion across latitude on the rotating earth. One reason is that winds are dynamically unstable if angular momentum increases with latitude. Cyclonic rotation cannot exceed that which would be given by zero pressure at the center (though because of friction this limit is never approached). Winds in anticyclones are limited by centrifugal force, giving in any latitude a definite relation between intensity and size. *Subject Heading:* **1. Dynamics of the atmosphere.**—*C.E.P.B.*

5.4–98 551.511:551.515.11

Petterssen, Sverre (*Chicago Univ.*), **On the relation between vorticity, deformation and divergence and the configuration of the pressure field.** *Tellus*, 5(3):231–237, Aug. **1953.** Also as: Chicago Univ. Dept. of Meteorology, Contract AF 19(604)-390, Technical Report, No. 1, April 1, **1953.** 11 p. 8 figs., eqs. **DWB**—Theorems for the vorticity, deformation and divergence are developed for quasi-horizontal frictionless motion. The divergence theorem is used to investigate the validity of the geostrophic approximation, and it is found that the balance between the Laplacian of the pressure field and the vorticity is appreciably influenced by the deformation, while the divergence is relatively unimportant. The vorticity theorem and the deformation theorem are combined to obtain a prediction quantity which is related to the absolute vorticity and permits treatment of the fields which are more general than the geostrophic field. Some charts are produced to show the magnitudes of the various quantities in a mature storm. *Subject Headings:* **1. Dynamics of the atmosphere 2. Structure of depressions 3. Vorticity. I. Chicago Univ. Dept. of Meteorology II. Contract AF 19(604)-390.**—*Author's abstract.*

5.4–99 551.511

Wippermann, Fritz, **Versuch einer quantitativen Ermittlung der Wärmequellen und -sinken in einer rotationssymmetrischen Zirkulation (Vorläufige Mitteilung).** [Attempt at a quantitative estimation of heat sources and sinks in a symmetrical rotating circulation (advance communication).] *Annalen der Meteorologie*, 5(7–12):358–362, **1952.** fig., 4 refs., eqs. Discussion p. 362. **MH-BH**—The distribution of heat sources in a stationary symmetrical circulation is evaluated from the energy of the currents coming from them. The equations are set out and a solution obtained by numerical integration. This is applied to a meridional section of an average winter pressure distribution between equator and pole up to above 100 mb. *Subject Heading:* **1. Heat exchange.**—*C.E.P.B.*

GENERAL CIRCULATION

See also: **Statistical study of blocking patterns at 500 mb** (Wolff), 5.4–60; **Jet stream** (Johnson), 5.4–163.

5.4–100 551.513:551.583.3

Flohn, Hermann, **Studien über die atmosphärische Zirkulation in der letzten Eiszeit.** [Studies on the atmospheric circulation in the last glacial period.] *Erdkunde*, 7(4):266–275, **1953.** 2 figs., table, 31 refs. English summary p. 266. **DLC**—Cold winters 1939–42 are pointers to atmospheric circulation during Ice Age. It was characterized by shrinkage of subtropical desert belt, and moderate expansion of tropical rain belt. Planetary frontal zone was shifted 10–15° to S. and cellular components were strengthened (low index type). I T Z was strengthened, Iceland and Aleutian lows split up, and warm polar anticyclone developed (cooling in 75°N only 2–3°C). There must have been a radical change in Late Glacial. Outflow from ice sheets was a negligible factor; temperature fell throughout troposphere. World evaporation decreased by at least 20%. Cooling is attributed to changes of solar activity on different parts of the spectrum. *Subject Headings:* **1. General circulation 2. Glacial periods.**—*C.E.P.B.*

5.4–101 551.513

§Rubin, Morton Joseph (*U.S.W.B.*) and Van Loon, Harry (*M.I.T.*), **Aspects of the circulation of the Southern Hemisphere.** [March **1953.**] 18 p. 4 tables, 3 charts (fold.). Typescript. Also in: *Journal of Meteorology*, 11(1):68–76, Feb. **1954.** 8 figs., 4 tables, 9 refs. **DWB**—An evaluation is made of the synoptic features and characteristic pressure patterns of the Southern Hemisphere as they relate to the seasonal circulations. Examples of both strong and weak polar outbreaks are presented and their effect on the zonal circulation is discussed. The implications of the strong zonal circulation and its short-term as well as seasonal variations are examined. *Subject Headings:* **1. Zonal circulation 2. Southern Hemisphere.**—*Authors' abstract.*

5.4–102 551.513:525.3

Van Mieghem, Jacques, **Seasonal fluctuations of the earth's rotation and the general circulation of the atmosphere.** *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 35:24–26, **1952.** fig., 7 refs. **MH-BH**—Seasonal fluctuations of earth's rotation (maximum Aug., minimum March) are compared with those calculated from exchange of W-momentum between atmosphere and earth, with good agreement. *Subject Headings:* **1. Rotation of the earth 2. General circulation.**—*C.E.P.B.*

5.4–103 551.513.1:551.511

Berg, Hellmut (*Met. Inst., Cologne Univ.*), **Zur Blockierung der Westwinddrift.** [Blocking action in the westerlies.] *Geofisica Pura e Applicata*, 25:92–100, **1953.** 12 figs., 9 refs. German and English summaries p. 92. **MH-BH**—The blocking action of the west wind drift occurs with maximum frequency between 0 and 20°E, especially between October and April. The corresponding area of convergence lies most frequently between 40 and 60°E. The shifting of the point of divergence is independent of that of the point of convergence and also independent of the maximum wind speed before the point of divergence. A shifting of the divergence towards the north seems to correspond to a slight shifting of the block to the east, while a displacement of the convergence towards the east is coupled with a shifting to the south. Two examples show that the ridges and troughs belonging to one block move independently of each other; the waves at the northern part differ from those of the southern in speed and wavelength. It is therefore difficult to explain them as waves of a single jet stream. It has been attempted to treat them as separate and belonging to a polar current and an equatorial current as RAETHJEN does. *Subject Headings:* **1. Blocking action 2. Waves in the westerlies 3. Convergence.**—*Author's abstract.*

5.4–104 551.513.2:551.515

Essenwanger, Oskar, **Statistische Untersuchungen über die Verlagerung von Höhentrögen und -rücken.** [Statistical investigations of the displacement of upper troughs and ridges.] *Annalen der Meteorologie*, 5(7–12):328–333, **1952.** 7 figs., table, 7 refs. German and English summaries p. 328. Discussion p. 332–333. **MH-BH**—Statistics of troughs and ridges on 500 mb level in 55°N were punched on cards and a number of relations of speed of shift, wave-length L, amplitude and asymmetry are shown on graphs. ROSSBY's formula $c = U - (\beta L^2/4\pi^2)$ should be extended to take account of effect on speed c of asymmetry and amplitude. *Subject Heading:* **1. Waves in the westerlies.**—*C.E.P.B.*

ATMOSPHERIC DISTURBANCES

See also: **Cumulus cloud investigations** (Day, Murgatroyd), 5.4–28; **Radar and weather** (Foster), 5.4–29; **Multiple frontal analysis** (Gr. Brit. Naval Weather Serv.), 5.4–57; **Weather types** (Čadež), 5.4–62; **Displacement of upper troughs and ridges** (Essenwanger), 5.4–104; **Tidal wave, Feb. 1, 1953** (Poncelet), 5.4–153; **Distribution and growth of hydrometeors around deep cyclone** (Cunningham), 5.4–171; **Climatology of depressions and fronts** (Damman), 5.4–244.

5.4–105 551.515.3:551.556.1

Booker, Clyde A. (*New Engl. Power Service Co., Boston*), **Tower damage provides key to Worcester tornado data.** *Electrical World*, N. Y., 140(7):22–24, Aug. 17, **1953.** diagrs.

illus. (cover p.). **DWB**—Wind velocities of the Worcester tornado of June 1953 are deduced from damage done to electric power-line towers. Minimum velocity is calculated on the basis of known load resistance of destroyed towers, while the elastic limit of conductors (none of which were injured) provides the clue for maximum velocities. The track of the eye of the storm is marked by towers which did not fail. The storm path is shown in a map and diagrams with indication of wind velocities. Peripheral velocity is estimated to have reached 350 m.p.h. *Subject Headings:* **1. Tornado damage 2. Maximum wind load on towers 3. Wind velocity 4. Worcester, Mass.**—*G.T.*

5.4–106 551.515.3:551.556.1(764, 744)

Brooks, Edward M. (*St. Louis Univ.*), **Tornado tragedies of 1953.** *Weatherwise*, 6(4):100–103, Aug. **1953.** figs. **MH-BH**—Statistics on tornadoes in the U.S.A. in the spring of 1953 are comparable only with those of 1951 when over 300 tornadoes were reported. Loss of life in 1953 was usually great due to the two major series of tornadoes which are described in considerable detail: (1) the Waco-San Angelo (Texas) series and (2) the Flint (Mich.)-Worchester (Mass.) series; the last bringing the greatest loss of life and property from tornadoes in New England history. Maps and photographs show distribution in March, April, May and June; and other features. *Subject Headings:* **1. Tornado damage 2. Waco, Tex. 3. Worcester, Mass.**—*M.R.*

5.4–107 551.515.3:551.501

Molen, James Perry, **Eye witness account of inside of a tornado [of Aug. 8, 1912].** Greensboro, N. Carolina, March 5, **1953.** 1 p. Photostat. **DWB**—The author who was in a storm cellar in Hunt County, Texas (10 miles WNW of Greenville) when the tornado passed over head, gives a brief statement of his recollections (41 years later). He said illumination improved and he could see to a height of 500 ft or more inside the debris filled vortex where a purplish pink light "such as that from brush discharge or static electricity" prevailed. Immediately afterwards there was a heavy hailstorm that left a path 30 miles long. *Subject Headings:* **1. Tornado vortex observations 2. Hailstorms 3. Hunt County, Texas.**—*M.R.*

5.4–108 551.515.3(411):551.576.11

Phillips, P. E., **Cloud funnel over south Scotland.** *Meteorological Magazine*, London, 82(978):376, Dec. **1953.** photo. **MH-BH**—A good photo of a spout-like cloud funnel near Peebles on June 7, 1953. The spout was horizontal. Weather was fair with isolated showers, with upper winds light. *Subject Headings:* **1. Funnel clouds 2. Scotland.**—*C.E.P.B.*

5.4–109 551.515.3(046)

U. S. Weather Bureau, **Newspaper clipping summary [of newspaper articles on tornadoes].** Oct. 2, **1952.** 1 p. fold. illus. Photoduplication of clipping from newspapers. **DWB**—Seven clippings from Kansas and Oklahoma newspapers, informing the public on tornado features, their occurrence, safety, measures and the establishment of a warning system. *Subject Headings:* **1. Tornadoes 2. Tornado warnings 3. Newspaper articles.**—*A.A.*

5.4–110 551.515.3(548.9)

Waterspout, Bay of Bengal. *Marine Observer*, 23(162):201, Oct. **1953.** figs. **DWB**—Sketches of a well developed waterspout in 18½ N, 90 E on Oct. 3, 1952. *Subject Headings:* **1. Waterspouts 2. Bay of Bengal.**—*C.E.P.B.*

5.4–111 551.515.4:551.551

George, Joseph J. (*Eastern Air Lines*), **In the face of thunderstorms.** *Skyways*, N. Y., 12(7):14–15; 53–55, July **1953.** photo, diagrs. **DWB**—Remarks on severity of turbulence to be expected by a pilot flying in vicinity of thunderstorms, tornado or jet stream areas; and method of determining instability according to SHOWALTER's stability index and WHITING's method (based on relative vector of movement of squall line attending a cold front with respect to movement of warm air ahead of the front). Severe or extreme turbulence occurs when warm air movement opposes cold front movement; moderate or severe turbulence when cold front or squall movement is only factor as it would be in warm air mass parallel to squall line and light turbulence if warm air moves away from cold front at about same speed. *Subject*

Headings: **1. Thunderstorm turbulence 2. Whiting's turbulence criteria 3. Showalter's stability index.**—*M.R.*

5.4–112 551.515.4(469)

*Portugal. Serviço Meteorológico Nacional, **Frequency of thunderstorms in the national territory of Portugal in Europe.** *Portugal. Serviço Meteorológico Nacional, RT* 124, MEM 21, May 25, **1953.** 1 p. table. Also in its *Memorias*, v. 11, **1953.** **DWB**—Table gives mean monthly and annual frequency of thunderstorms at 15 stations in continental Portugal for period 1912–1941. *Subject Headings:* **1. Thunderstorm frequencies 2. Portugal.**—*M.R.*

5.4–113 551.515.4:551.594.21

Workman, E. J. and Reynolds, S. E., **Thunderstorm research program at the New Mexico School of Mines.** (In: **Thunderstorm electricity.** Chicago. University. Dept. of Meteorology, Oct. **1950.** p. 31–47. 4 figs.) **DWB**—Experimental data indicating the extreme of a considerable charge transfer between the solid and liquid phases during freezing and diagrams of apparatus for measuring the potential difference between experimentally produced ice crystals and water are presented. The effect of amount and kind of contaminants upon the sign and magnitude of the potential difference is discussed. Mechanism for the electric charge configuration of thunderstorms is presented and the relationship between contamination and sublimation nuclei (traces of ammonia and silver iodide) are considered. *Subject Headings:* **1. Thunderstorm research 2. Thunderstorm electricity 3. Condensation nuclei 4. New Mexico School of Mines.**—*I.L.D.*

5.4–114 551.515.41

Israël, Hans, **Bemerkungen zum Energie-Umsatz im Gewitter.** [Remarks on energy exchange in a thunderstorm.] *Geofisica Pura e Applicata*, 24:95–103, Jan./April **1953.** 3 figs., bibliog. p. 103. English summary p. 95. **DWB**—The energy balance of a thunderstorm is calculated and presented in graphical and analytical form. According to BRAHAM (*see item* 4.4–120, April 1953, *MAB*) the electrical energy is negligible compared with other forces, according to the author it amounts to 25% of that which is in excess of normal austausch energy if his estimates are correct. The average amount of energy in a lightning stroke is estimated as 2000 kw hours. Estimates of the amount of charge carried to the ground by precipitation in a thunderstorm, the counter currents and fair weather exchange are also discussed and considered. *Subject Headings:* **1. Thunderstorm dynamics 2. Thunderstorm energy budget 3. Lightning charges. I. Braham, R. R., Jr.**—*M.R.*

5.4–115 551.515.41

Wichmann, Heinz, **Strömungsvorgänge in der Gewitterwolke.** [Currents in thunderclouds.] *Annalen der Meteorologie*, 5(7–12):388–390, **1952.** 7 refs. German and English summaries p. 388. Discussion p. 390. **MH-BH**—Observations with gliders in Rhön thunderstorms and with aircraft in Florida give different pictures of the circulation and origin of hail. The cause of these differences is attributed not to differences in thunderstorm structure, but to different methods of observation. *Subject Heading:* **1. Thunderstorm structure 2. Hail formation.**—*C.E.P.B.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Atmos. and radiation phenomena** (Roulleau, Trochon), 5.4–3; **Radiation balance, Dolgoprudnaia Station, U.S.S.R.** (Chikirova), 5.4–20; **Pressure broadening** (Smith), 5.4–145; **Season, nutrition and pellagra** (Sargent, F. and V.), 5.4–233; **Met. and geophysical observations on occasion of eclipse, Feb. 25, 1952, Portugal** (Portugal Met. Serv.), 5.4–246.

5.4–116 551.521.3:551.521.61

†Hilsum, C., **Atmospheric attenuation of infra-red and visible radiation.** *Teddington, England. Admiralty Research Laboratory*, [*Report*], A.R.L/r3/E 600, Dec. **1948.** 80 p. 18

plates, 7 tables, numerous refs. Mimeo. **GB-MO**—This memorandum surveys many hundreds of references which are classified under 64 headings. A short discussion is given of the laws of absorption, the effects of pressure and temperature, and the theory of scattering by small particles. In the visible range attenuation is almost entirely caused by scattering and the visual range can be evaluated from the number and size of the particles (mainly combustion nuclei and salt) in the air. Transmission of radiation through fog, and through artificial fog smoke is discussed and compared with theory. *Subject Heading:* **1. Infrared absorption spectrum.**—*C.E.P.B.*

5.4–117 551.521.3 551.501:551.591

Stewart, Harold S. and Curcio, Joseph A. (*Nav. Res. Lab., Wash., D. C.*), **The influence of field of view on measurements of atmospheric transmission.** *Optical Society of America, Journal*, 42(11):801–805, Nov. **1952.** 5 figs., 3 tables, 7 eqs. **DWB**—Proposed formula: $T_\theta = T + 0.5(1-T)(1-e^{-\theta})$; T_θ—transmittance at a particular wavelength measured with an instrument having a field of view θ radians in diameter, T—transmittance for unscattered light alone. Results of measurements made over water at sea level presented in graphs. *Subject Headings:* **1. Atmospheric transmission 2. Visibility measurement techniques.**—*A.A.*

5.4–118 551.521.31

Friedrichs, H., **Die Himmelsstrahlung als Funktion des Trübungsfaktors T und des Kurzstrahlungsfaktors T_K für einzelne Sonnenhöhenstufen.** [Sky radiation as a function of the turbidity factor T and of the short-wave radiation factor T_K for individual sun heights.] *Meteorologische Rundschau*, 6(7/8):145, July/Aug. **1953.** 2 figs., ref. **DWB**—Curves are given showing sky radiation at Wahnsdorf plotted against total turbidity and short-wave turbidity for different solar heights 7.5–62.5°. *Subject Headings:* **1. Sky radiation 2. Turbidity.**—*C.E.P.B.*

5.4–119 551.521.31

IAroslavtsev, I. N., **Raspredelenie iarkosteĭ po nebu.** [Distribution of sky brightness.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 1:83–94, **1953.** 13 figs., 11 refs. **DLC**—Measurements of sky brightness were carried out at Tashkent by means of: 1) a specially constructed photometer in which the brightness of the sky at different points is rendered equal to the sky brightness at the zenith and 2) a selenium or silver sulfate photocell. The results of measurements of sky brightness for various wave lengths, namely white light, ultraviolet, blue, yellow and red light, both for clear and cloudy skies are presented graphically. For cloudless skies the configuration of the isolines is similar for all wave lengths and is asymmetrical in two directions. For cloudy skies four types of isolines are observed. *Subject Headings:* **1. Sky brightness measurements 2. Tashkent, U.S.S.R.**—*I.L.D.*

5.4–120 551.521.31:551.555.8

Krylov, P. A., **K voprosu o sukhoveiakh v Povolzh'e.** [Contribution to the problem of dry winds in the Volga Region.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 5:76–85, **1952.** 7 figs., 3 tables, 6 refs. **DLC**—Results of solar radiation measurements made during 40 summer days discussed. The calculated absorption coefficient during dry winds can be explained only by presence of absorbing dust particles. *Subject Headings:* **1. Dust 2. Turbidity 3. Dry winds 4. Volga Region, U.S.S.R.**—*A.A.*

5.4–121 551.521.32:551.578.46

Hering, W. S. (*Walla Walla, Wash.*), **Evaluation of outward long wave radiation from the snow surface.** U. S. Corps of Engineers, Project CW-171, Technical Bulletin, No. 7, April 24, **1950.** 3 p. 4 eqs., 2 refs. **DWB**—Two expressions for outward long wave radiation from a snowpack are presented, one for clear sky (based on BRUNT's formula) and one for cloudy sky (following ÅNGSTRÖM's equation). The former accounts for snow surface temperature and vapor pressure, the latter for vapor pressure, sky cover and height of clouds. Computations were made for the Central Sierra Snow Laboratory. *Subject Headings:* **1. Snow pack 2. Snow cover radiation 3. Central Sierra Snow Laboratory. I. Project CW-171 II. U. S. Corps of Engineers.**—*G.T.*

5.4–122 551.521.4

Auberger, L., **Notes sur l'origine du rayonnement du ciel nocturne.** [Note on the origin of the radiation of the night sky.] *Journal of Geophysical Research*, 58(2):231–233, June **1953.** tables, 3 refs. In French, English summary p. 231. **MH-BH**—Objections can be formulated against the identification of many radiations of the night sky with the Herzberg bands of 0^2. The author states that only five or six can be attributed to the Herzberg system; for the most part those bands probably belong to unknown forbidden systems of nitrogen (several are pointed out). *Subject Heading:* **1. Night airglow spectrum.**—*Author's abstract.*

5.4–123 551.521.4

Götz, F. W. Paul and Nicolet, M., **Sur des observations à la limite ultraviolette du spectre du ciel nocturne.** [Observations of the ultraviolet border of the night sky spectrum.] *Journal of Geophysical Research*, 56(4):577–582, Dec. **1951.** 3 figs., 9 refs. **DWB**—Airglow spectrum from 2950 up to 3580 Å graphically represented and interpreted. Herzberg bands identified and the possible presence of OH electronic systems discussed. *Subject Headings:* **1. Night airglow spectrum 2. Night airglow.**—*A.A.*

5.4–124 551.521.4

Hoffmeister, C., **Investigations on bright night sky and luminous bands.** *British Astronomical Association, Journal*, 62(8):288–292, Oct. **1952.** plate, 5 refs. **DWB**—Bright night skies are classified into 4 types and distribution and annual variation described. Emission height 90–180 km, especially 120–130 km. Attributed to release of stored solar energy through agency of cosmic dust particles. Persistent details given information about upper winds. Stripes are regarded as Helmholz waves at layers of discontinuity. *Subject Heading:* **1. Night airglow.**—*C.E.P.B.*

5.4–125 551.521.4:551.521.61

Jones, A. Vallance and Gush, Herbert, **Spectrum of the night sky in the range 1.2–2μ.** *Nature*, London, 172(4376):496, Sept. 12, **1953.** fig., 7 refs. **DWB**—Using lead sulphide cell and grating spectrograph at Saskatoon in June 1953, strong emission was found in region of 1.5μ. All bands in 1.2–2μ can be attributed to OH. *Subject Headings:* **1. Night airglow spectrum 2. Saskatoon, Canada.**—*C.E.P.B.*

5.4–126 551.521.4

Meinel, A. B. (*Yerkes Obs.*), **Origin of the continuum in the night-sky spectrum.** *Astrophysical Journal*, 118(2):200–204, Sept. **1953.** 2 figs., refs. **DWB**—A re-examination of the continuum of the airglow spectrum in the region 3700–4800 A has shown that the continuum may be more completely due to starlight than has been supposed. The H and K lines of calcium and Hδ are found to be prominent on all airglow spectra. The spectral class is definitely earlier than solar (G2), being F8 and H and FO at H and K. The emission at 3914 A in the airglow is identified as N_2^+ (0,0) and represents a true permanent aurora due to the excitation by cosmic-ray particles. *Subject Headings:* **1. Night airglow spectrum 2. Night sky continuum.**—*Author's abstract.*

5.4–127 551.521.4:551.594.51:535.33

Pearse, R. W. B. (*Imperial College, London*), **The spectrum of the night sky: some problems in the identifications.** (In: International conference on the emission spectra of the night sky and aurorae, London, **1947, Papers.** 1948. p. 12–15. 14 refs.) **DWB**—Night sky spectrum contains a yellow (sodium) line in addition to the red and green auroral lines even when no aurora is visible. Recently feeble radiations of over 100 wavelengths in blue and violet, and as many again in ultraviolet between 3900 and 3100 Å have been discovered in night sky spectra, and are almost constant in both intensity and spectral composition in all parts of the earth and in all directions. Oxygen lines appear in both auroral and night sky spectra, but N_2^+ and N_2 only in auroral activity. Difficulties in attempting to compare spectra with so many feeble lines and bands, or to identify them with laboratory spectra of known origin, are cited. Presence of CO to account for $w' = 2560$ is not sure. *Subject Headings:* **1. Night airglow spectrum 2.Auroral spectra 3. Carbon monoxide in atmosphere 4. Spectroscopy.**—*M.R.*

5.4–128 551.521.4

Pikel'ner, S. B. and CHuvaev, K. K., **O veroiatnom mekhanizme svecheniia nochnogo neba v nepreryvnom spektre.** [On the possible mechanism of the night sky brightness in a constant spectrum.] *Akademiia Nauk SSSR, Doklady*, 88(4):661–663, Feb. 1, **1953.** 6 refs., eq. **DLC**—Observations made by K. K. CHUVAEV, with color filters showed that in range 4720–5580 Å the distribution of energy depends slightly on wave length. The probable height of layers which radiate the normal spectrum was determined as being about 460 km. The low concentration of electrons at those heights can not form any noticeable normal spectrum. Consequently, the processes of formation of the negative oxygen ions were studied. Results presented are in good agreement with observational data and the processes of ion formation might be considered as factors which affected the night sky brightness. *Subject Headings:* **1. Night airglow spectrum 2. Ion formation.**—*N.T.Z.*

5.4–129 551.521.4:551.576

*Raman, P. K. (*Met. Off., St. Thomas Mount, Madras*), **Radiation from overcast skies during night.** *Indian Journal of Meteorology and Geophysics*, 4(3):261–262, July **1953.** table, 5 refs. **MH-BH**—A brief summary of results of radiation measurements made at Poona, India with an Ångstrom pyrgeometer, shows that net radiation on clear nights is 0.174 ly/min and with high overcast 0.130 and low overcast 0.026 ly/min. Comparison is made with data for various cloud types made at a number of other stations in various parts of the world. On some nights during monsoon a net loss of radiation which was zero or negative was recorded (from very low clouds) at Poona. *Subject Headings:* **1. Radiation from clouds 2. Nocturnal radiation data 3. Poona, India.**—*M.R.*

5.4–130 551.521.6

Gershun, A. A., **O spektral'noĭ plotnosti izlucheniia.** [Spectral radiation density.] *Uspekhi Fizicheskikh Nauk*, Moscow, 46(3):388–395, March **1952.** 2 figs., 3 refs., eqs. **DLC**—The fact that the maximum spectral intensity of black body radiation according to wave length lies in a different region from that according to frequency, often results in confusion even in the best textbooks. The difference can be easily shown from PLANCK's radiation law. Author proposes to use the term "spectral density" instead of the misleading "spectral intensity." The median $\lambda m\,[\mu]$ of the spectral distribution could be used as a characteristic value which would result in the displacement law $\lambda m = \frac{4105.}{T}$ Another important possibility is only briefly mentioned (p. 391): the use of a logarithmic scale of wave-length, which gives the result that the maximum ordinate is proportional to T^4, while a proportionality to T^5 exists for an ordinary wavelength scale, and to T^3 for a frequency scale. *Subject Headings:* **1. Spectral radiation distribution 2. Definitions.**—*A.A.*

AIR TEMPERATURE

See also: **Settling of particles in thermal gradient** (DallaValle, others), 5.4–86; **Constancy of frequency of some temp. and pressure waves** (Simojki), 5.4–146; **Standardization of wind pressure and temp. variations in design of overhead lines** (Datta), 5.4–156.

5.4–131 551.524:551.586:628.8

Hertzler, John R. and Kartorie, V. T. (*York Corp.*), **Climatic factors measure air conditioning potentials.** *Heating, Piping and Air Conditioning*, Chicago, 25(5):77–84, May **1953.** 2 tables, 5 figs., ports. **DWB**—Data on climatic discomfort for cities throughout the U. S. are presented in tables and charts for the purpose of determining sales potentials of air conditioning equipment. The climatic discomfort index is based on duration and intensity factors of dry and wet bulb temperature. *Subject Headings:* **1. Climatic discomfort 2. Air conditioning 3. Summer temperatures 4. United States.**—*G.T.*

5.4–132 551.524(496) 551.577(496)

*[Türkey. Meteorological Service?] **Sicaklik ve yağis ortalama kiymetleri. Twelve year average.** [Mean values of temperature and precipitation.] [**1953?**] 2 p. all tables.

Carbon of typescript. Ms. note on p. 1: Manuscript data procured by the U. S. Fish and Wild Life Service in Turkey. **DWB**—Two sheets of data give 12 year average monthly maximum and minimum temperature and precipitation for 17 stations in Turkey. Names of months at head of columns are in Turkish. *Subject Headings:* **1. Temperature data 2. Precipitation data 3. Turkey.**—*M.R.*

5.4–133 551.524.1

Richardson, W. E., **"Remarkable" rises in temperature.** *Meteorological Magazine*, London, 82(978):374–375, Dec. **1953.** 2 tables, 3 refs. **MH-BH**—Temperature rises of 10°F or more in 2 hrs are more frequent at the valley bottom (900 ft) than at 1070 ft at Alston, Cumberland. Maximum rise 18°F. *Subject Heading:* **1. Temperature microvariations.**—*C.E.P.B.*

5.4–134 551.524.1:551.501.7

Sawyer, J. S., **Effect of atmospheric inhomogeneity on the interpretation of vertical temperature soundings.** *Meteorological Magazine*, London, 82(975):257–263, Sept. **1953.** 6 figs., 2 refs. **MH-BH.** Also as: *Great Britain. Meteorological Research Committee, M.R.P.* 775. **GB-MO**—*Subject Headings:* **1. Temperature microvariations 2. Aerological diagrams.**—*C.E.P.B.*

5.4–135 551.524.2(41/2)

*Great Britain. Meteorological Office, **Averages of temperature for Great Britain and Northern Ireland, 1921–50.** London, H.M.S.O., **1953.** 36 p. mainly tables. Mimeo. M.O. 571. **GB-MO**—Tables are given of mean daily maximum, mean daily minimum, and their mean for each month. For 7 representative stations mean temperatures are given for 1901–30, 1906–35 and 1921–50; the latter period was slightly colder than the earlier ones in winter, especially in England, slightly warmer in spring and autumn, and more than 1°F warmer in summer. *Subject Headings:* **1. Temperature normals 2. Great Britain 3. Northern Ireland.**—*C.E.P.B.*

5.4–136 551.524.2:551.542

***Normalwerte des Luftdruckes auf der Nordhemisphäre für die Periode 1900–1939.** [Normal values of pressure in the Northern Hemisphere, 1900–1939.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 2(1), **1953.** 126 p. plates, bibliog. p. 125–126. Foreword by R. Scherhag p. 5. **DWB**—Charts and tables give mean monthly and annual values of pressure for 650 stations. Tables are also included giving similar values of temperature, Mean monthly pressure distribution over the polar region (1949–1952) is shown on separate charts. *Subject Headings:* **1. Pressure normals 2. Temperature normals 3. Northern Hemisphere charts.**—*C.E.P.B.*

5.4–137 551.524.2/3:551.571.2/3(469)

*Portugal. Serviço Meteorológico Nacional, **Mean hourly values of air temperature and humidity at Lisbon Airport.** *Portugal. Serviço Meteorológico Nacional, RT* 128, MEM 25, May 25, **1953.** 5 p. tables, graphs. Also in its *Memórias*, v. 11, **1953. DWB**—Hourly means of air temperature and relative humidity are tabulated for each month for Lisbon Airport (period 1947–1951) and shown graphically by means of isopleth diagrams. *Subject Headings:* **1. Temperature data 2. Relative humidity data 3. Lisbon Airport, Portugal.**—*M.R.*

5.4–138 551.524.2(86)

Schröder, R., **Die Verteilung der mittleren Lufttemperatur in Kolumbien.** [Distribution of mean temperature in Colombia.] *Bonner Geographische Abhandlungen*, Bonn, No. 9:120–123, **1952.** chart, refs., bibliog. p. 122. **DWB**—A chart showing the mean annual temperature in Colombia was constructed by the author. Owing to sparse network of stations, incomplete records and inadequate methods of observations, the isotherms were drawn for 2°C intervals. The distribution of temperature is not simply a function of height above sea level, but the position of the isotherms is determined also by the total effect of elevation, the atmospheric circulation, orography, of local and temporal precipitation and of oceanic in-

fluences. A discussion of the map is presented. *Subject Headings:* **1. Temperature distribution 2. Colombia.**—*I.L.D.*

5.4–139 551.524.31

*Conrad, V., **The components of the diurnal variation of temperature on Mt. Washington and other summits.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 6(1):78–107, 1953. 5 figs., 8 tables, 32 refs. English, German and French summaries p. 78–81. **MH-BH**—Annual and diurnal temperature variations on Mt. Washington (44°16′N. 71°6′W, 6280 ft) and Sonnblick (47°4′N. 12°57′E, 10,190 ft) are compared. Hourly deviations from daily means (10 yrs) at Washington are tabulated and analyzed into Fourier series, which are compared with those for Sonnblick. Annual variations of phase and amplitude of 24 and 12 hr waves and ratio a_2/a_1 are discussed in detail and differences related to physical conditions of surface. The semidiurnal temperature wave is attributed to the semidiurnal pressure wave. *Subject Headings:* **1. Diurnal temperature variations 2. Mount Washington, N. H. 3. Sonnblick, Austria.**—*C.E.P.B.*

5.4–140 551.524.34:551.501.9

*Mitchell, J. Murray, Jr., **On the causes of instrumentally observed secular temperature trends.** *Journal of Meteorology*, 10(4):244–261, Aug. 1953. 7 figs., 11 tables, 28 refs. **MH-BH**—Secular changes of temperature are classed as: apparent—due to shelter, thermometer, location or statistical methods; local—due to changes in urban or other surroundings; directly climatic—due to changes in circulation, glaciation or sea temperature; and indirectly climatic (botanic, geologic or atmospheric). At New Haven, Conn., winter records in city (roof) and at airport (grass) 1939–1943 give warming effect of city as 1.5°F, increasing with time. At Blue Hill, near Boston, temperatures of different winds 1890–1905 and 1935–50 show mean rise of 0.8°F, most of which is truly climatic. Study of 77 U. S. stations 1900–1940 showed average rise of 1–2°F proportional to square root of population (except in very large cities) and also related to seasonal means. Thus observed recent warming is due partly to warmer climate and partly to city growth. Records before 1890 are regarded as misleading. *Subject Headings:* **1. Temperature trends 2. Instrument exposure.**—*C.E.P.B.*

SOIL TEMPERATURE

5.4–141 551.525.5

Legget, Robert F. and Crawford, C. B. (*Nat. Res. Council of Canada, Div. of Building Res.*), **Soil temperatures in water works practice.** *American Water Works Association, New York, Journal*, 44(10):923–939, Oct. 1952. 16 figs., 14 refs. **DLC**—The main purpose of this study, which is based on a great number of observations, is the determination of frost penetration in different kinds of soil dependent on meteorological conditions. Automatic temperature and moisture recorders used. Purpose to determine relation of soil temperature to freezing of water pipes. The freezing index (degree-days) shows a direct relationship to frost penetration. Freezing indexes for Ottawa shown from 1885 to 1950. Soil freezing under snow cover considerably reduced (at least by an amount equal to its own thickness). *Subject Headings:* **1. Soil freezing 2. Soil temperatures 3. Freezing index 4. Snow cover influences 5. Ottawa, Canada.**—*A.A.*

5.4–142 551.525.5:551.311.16:551.583.3

Wolfe, Peter E. (*Rutgers Univ.*), **Periglacial frost-thaw basins in New Jersey.** *Journal of Geology*, Chicago, 61(2):133–141, March 1953. 3 plates, 4 figs. (1 fold.), 7 refs. **DWB**—The theory that these numerous shallow basins, which occur all over Southern New Jersey from the Piedmont to Cape May, and in all types of soil, were caused by meteorites or by dissolving of soluble rock formation, is rejected in favor of the frost-thaw basin theory which is supported by the recent aerial surveys and tests made in cuts along the New Jersey Turnpike. Conditions in periglacial (Wisconsin) time are thought to have been similar to those now prevailing in the Arctic where ice lenses of varying size form in permafrost areas. The largest lenses (about 1 sq. mile) occur where the most moisture is available. Vegetation and snow cover as well as terrain affect the size and character of the frost lenses, the consequent heaving

and eventual basins. Wind action has modified their character. *Subject Headings:* **1. Frost thaw basins 2. Permafrost 3. New Jersey.**—*M.R.*

SEA TEMPERATURES

5.4–143 551.526

*U. S. Coast and Geodetic Survey, **Surface water temperatures at tide stations, Atlantic Coast, North and South America.** *U. S. Coast and Geodetic Survey, Special Publication*, No. 278, **1951** rev. ed. 57 p. mostly tables. **DWB**—Extensive tables and charts of data on monthly and annual mean temperature of surface water (bucket measurements) for each year of record and averages for entire period of record, and extremes each year and for each month. The 82 stations range from Ivigtut, Greenland to Panama and southern Brazil, and in the Gulf of Mexico to Galveston, etc. Some continuous records date from 1914–1950 (Baltimore) and broken records date back to 1887. Bi-hourly readings are given for 1949–50 for Bar Harbor, New York, Atlantic City, Washington, D. C., Dayton, Balboa, etc. *Subject Headings:* **1. Sea surface temperature data 2. Atlantic Coast, North America 3. Atlantic Coast, South America 4. Gulf of Mexico coast.**—*M.R.*

5.4–144 551.526.6:536.421

†Breitner, Hans J., **Entmischung beim Gefrieren wässeriger Lösungen.** [Separation by freezing of aqueous solutions.] *Deutsche Hydrographische Zeitschrift*, 6(2):80–86, **1953.** 2 figs., 41 refs. German, English and French summaries p. 80–81. **DWB**—A study of the effect of concentration and cooling temperature of salt solutions on the structure of their ice. With increasing salinity at constant temperature and in some cases with increasing rapidity of freezing at constant salinity, the ice passes from granular through various stages to fibrous structure. The salt content of sea ice at different temperatures is compared. *Subject Heading:* **1. Freezing of sea water.**—*C.E.P.B.*

PRESSURE AND WIND

PRESSURE

See also: **Normal pressure, N. Hemisphere, 1900–39** (Berlin, Freie Univ.), 5.4–136; **Westerly flow at 300 mb, Australia, New Zealand** (Porter), 5.4–165; **Height of base of free atmos. over ocean** (Roulleau), 5.4–166.

5.4–145 551.54:551.521

†*Smith, William V. (*Univ. of Delaware*), **Pressure broadening.** *New York Academy of Sciences, Annals*, 55:891–902, Nov. 21, **1952.** 2 figs., 7 tables, 42 refs., 8 eqs. **DWB**—Line-width measurements by many workers and for several types of interaction are tabulated and compared with theory. For pressures of less than one atmosphere line-widths have been found to be directly proportional to the pressure in all cases for which Doppler broadening was unimportant. Experimental evidence thus far definitely favors the collision theory of broadening rather that the various statistical theories which yield asymmetrical line-shapes. The author believes that WEBER's finding that the ammonia collision diameter is independent of mix ratio for foreign broadening is correct, and that the results at variance with this must be due to systematic errors. *Subject Heading:* **1. Pressure broadening.**—*L. Kaplan.*

5.4–146 551.543.3(471) 551.524(471)

*Simojoki, Heikki, **On the constancy of the frequency of some temperature and air pressure waves.** *Geophysica*, Helsinki, (2):48–53, **1953.** 4 figs., 2 tables, 4 refs. **DWB**—The frequency of maxima and minima on annual courses of five day means of pressure and temperature for Helsinki, not adjusted for seasonal variation, was computed for each summer, winter and year from Oct. 1921 to Sept. 1951. The average rhythm length of pressure was 17, of temperature 19 days, that is 3–4 times the basic period. Furthermore, the author discusses singularities, symmetry points and rhythms for years with mild and cold winters in the mean

annual course. *Subject Headings:* **1. Pressure rhythms 2. Temperature rhythms 3. Singularities 4. Helsinki, Finland.**—*A.A.*

5.4–147 551.543.5:551.557.35

§Isozaki, I., **A mechanism of pressure disturbance.** *Journal of Meteorological Research*, Tokyo, 4(3):97–105, May **1952.** 16 figs. In Japanese; English summary p. (7). **MH-BH**—Account of an unusual pressure disturbance which occurred over Tokai and Kanto districts while meteorological elements other than pressure showed no particular disturbance. Records of synoptic elements and weather charts for the time of the disturbance are presented. From these the author derives the mechanism of pressure development which he describes as the effect of interaction between the invasion of strong westerlies in the middle troposphere and a weak upper-air high, followed by jet-stream-like invasion of warm air from the south causing the sudden fall in pressure. *Subject Headings:* **1. Pressure fluctuations 2. Jet stream 3. Upper air wind variations.**—*G.T.*

WIND

See also: **Wind at Dolgoprudnaia Station, U.S.S.R.** (Lednev), 5.4–24; **Atmos. turbulence measurements and analysis** (MacCready), 5.4–40; **In the face of thunderstorms** (George), 5.4–111; **Vertical air motion in lowest atmos.** (Frankenberger), 5.4–168; **Diffusion by turbulent motion near forest** (Hori), 5.4–183.

5.4–148 551.55(261.3) 551.465

*Lisitzin, Eugenie (*Finnish Inst. of Marine Res.*), **Observations on currents and winds made on board Finnish light-ships during the years 1948 and 1949.** *Finland. Merentutkimuslaitos, Julkaisu*, No. 147, **1951.** 41 p. entirely tables. In English. **DWB**—Observations of the direction of wind and currents (scale 1–32), of wind force (Beaufort scale) and current velocity [cm. sec^{-1}] were made at 7, 14 and 21h Finnish standard time. Complete results of observations made during the navigation season are given for 7 light ships. *Subject Headings:* **1. Sea currents 2. Wind data 3. Baltic Sea 4. Finland.**—*A.A.*

5.4–149 551.55:494.5

May, W. E., **The Finnish compass card.** *Institute of Navigation, Journal*, 6(3):248–254, July **1953.** 2 figs. **DWB**—Includes list of past and present names of Finnish compass points and wind directions. *Subject Headings:* **1. Winds 2. Finnish language.**—*C.E.P.B.*

5.4–150 551.551:551.508.53:551.507.352

Bunker, Andrew F., **Investigations into a method of shearing stress determination from an airplane in flight.** Woods Hole Oceanographic Institution, Contract N6onr-27702, Project NR-082-021, Technical Report, No. 24, July **1953.** 33 p. 3 figs., 2 tables, 8 refs. "Unpublished manuscript." **DWB**—Shearing stresses and eddy viscosities in the atmosphere are computed on the basis of accelerometer records on an airplane, carrying also a pressure gage anemometer, a hygroscope and drift sight meter. The report deals with the theory of computation and the necessary observing procedures in order to avoid possible pitfalls. Only a part of the total spectrum of eddies can be observed, since small and very large eddies cannot be detected. Actual samples are given for measurements made in the Atlantic trade belt region (north from San Juan and Anegada Islands). The eddy viscosity was 100–200 [gm $cm^{-1}sec^{-1}$] at 15 m height and rapidly decreased in the lower 300 m. *Subject Headings:* **1. Eddy measurements by airplane 2. Accelerometer records 3. West Indies. I. Woods Hole Oceanographic Institution II. Contract N6onr-27702.**—*A.A.*

5.4–151 551.551:551.511

Emmons, H. W., **The laminar-turbulent transition in a boundary layer, Part I.** *Journal of the Aeronautical Sciences*, 18(7):490–498, July **1951.** 11 figs., tables, refs., 19 eqs. **DLC**—A probability transition theory is given, based on actual observations in the boundary layer. *Subject Headings:* **1. Turbulence theory 2. Boundary layer.**—*A.A.*

WIND VARIATIONS AND SPECIAL WINDS

See also: **Why aren't our heads blown off** (James), 5.4–97; **Dry winds, Volga region** (Krylov), 5.4–120.

5.4–152 551.553.6 551.506:519.24

*Lorente, José María, **Frecuencia de las velocidades del viento: obtención aproximada de su curva.** [Frequency of wind velocity: the approximate construction of its curve. Pt. 1.] *Revista de Geofísica*, Madrid, 11(43):252–271, July/Sept. **1952.** Pt. 2, *ibid.*, 11(44):339–348, Oct./Dec. **1952. DWB**—In order to make it possible to construct wind speed frequency curves for places where not much data are available, such as where wind generators, electric power lines or wind erosion studies are built or undertaken. The data for 1949 from a Fuess universal anemograph installed at the Madrid Observatory are analyzed in great detail, and the monthly frequency of hourly wind movements of velocities from 0 to 44 km/hr (by 1 km intervals) tabulated and graphed to show correlation between the frequency curve when based on hourly (8760), 4 times daily (1460), thrice daily (1095) and once daily (365 noon) observations. No significant difference is evident in the annual curve, although seasonal curves might show marked variation depending on the time of observation for the 1 or 3 daily values. A method is then worked out for constructing a histogram and a velocity curve from the mean wind speed data. *Subject Headings:* **1. Wind speed frequency curves 2. Statistical methods in climatology 3. Madrid, Spain.**—*M.R.*

5.4–153 551.553.8:551.515:525.63

Poncelet, L., **A propos du "ras de marée" du 1 février 1953.** [The "tidal wave" of Feb. 1, 1953.] *Ciel et Terre*, 59(3/4):93–96, March/April **1953.** refs. **MH-BH**—Definitions of the term "ras de marée" (tidal wave) found in various encyclopedias and articles show that there is a lack of uniformity in the use of the term. There is no definite agreement as to the causes of the phenomenon. It would appear that tidal waves are of volcanic or seismic origin and should not be confused with storm waves or storm tides. The author examines the meteorological factors connected with the disaster of Feb. 1, 1953 and finds that it may be defined as a storm tide rather than a tidal wave. *Subject Headings:* **1. Tidal waves 2. Storm tides 3. Belgium.**—*G.T.*

5.4–154 551.555

Graham, Howard E. (*U.S.W.B., Portland, Oregon*), **The Columbia Gorge wind funnel.** *Weatherwise*, 6(4):104–107, Aug. **1953.** 7 figs., 2 refs. **MH-BH**—The physiographic features responsible for the famous "gorge winds" in the Columbia River Gorge just east of Portland, Ore., are described and the synoptic conditions which give rise to: 1) easterly gales and 2) strong westerly winds around the Dulles, outlined and illustrated by a series of regional synoptic charts. Since the gorge winds are usually directly across the isobars, any anticyclone east of the Cascade Mountains gives easterly gales and a ridge to the west, coupled with strong heating in the Columbia Basin to strong westerly winds. Effects on water level behind the Bonneville Dam have economic importance and so these winds must be forecast. *Subject Headings:* **1. Gorge winds 2. Columbia River Gorge, Oregon.**—*M.R.*

5.4–155 551.555.4

§Prudhomme, A. and Boujon, A.-H., **Sur les tempêtes observées en Terre Adélie.** [Storms observed on Adélie Land.] *La Météorologie*, 4th Ser., No. 27:132–140, July/Sept. **1952.** 3 figs., 12 refs. **MH-BH**—The authors, members of the French Antarctic expedition 1950–51, describe the general atmospheric circulation connected with the Antarctic glacial calotte emphasizing features of interest for Adélie Land. A sample synoptic map is presented. The katabatic wind is discussed particularly, showing the anemometer and thermograph record and describing other simultaneous local weather effects. An explanation for the violence and persistence of the storms is attempted. *Subject Headings:* **1. Antarctic storms 2. Katabatic winds 3. Adélie Land, Antarctica.**—*A.A.*

WIND EFFECTS

See also: **Volcanic ash over Caribbean** (Brown), 5.4–85; **Tower damage, key to Worcester tornado data** (Booker), 5.4–105; **Tornado damage** (Brooks), 5.4–106.

5.4–156 551.556:551.524.3:621.315.1(54)

Datta, M., **Standardization of wind pressure and temperature variations as regards the design of overhead lines with particular reference to conditions in west Bengal.** *Indian Journal of Physics*, 25(6):279–286, June **1951.** 4 tables, 2 refs., eqs. **DLC**—Using a modified formula pertinent to the local climatic conditions of the state of West Bengal (instead of the general formula still used) the author shows how unnecessary construction expenditures can be avoided. *Subject Headings:* **1. Electrical engineering 2. Temperature variations 3. Wind pressure 4. West Bengal, India.**—*W.N.*

5.4–157 551.556:532.593:629.12

Hebecker, O., **Rollperiode und metazentrische Höhe als Stabilitätsanzeiger von Schiffen.** [Roll-period and metacentric height as a stability indicator for ships.] *Wetterlotse*, 49:232–240, Dec. **1952.** 2 figs. **DWB**—A geometric explanation of the rule given by author in *Wetterlotse* No. 43 for a rolling ship. It is shown that stability moment = displacement of metacentric height × sin (angle of half-roll). A graph shows relation between metacentric height and period of roll for ships of different width. *Subject Headings:* **1. Ship stability 2. Wind waves 3. Marine navigation.**—*C.E.P.B.*

5.4–158 551.556:532.593:629.12

Hebeker, Otto, **Seegang.** [State of the sea.] *Wetterlotse*, 56:97–105, April **1953.** 2 tables, 2 refs., 3 eqs. **DWB**—Discussion of wind waves and the strains they impose on a ship. Factors included are relations between wave period, length and velocity, and wind force, and effects on ships of different length and displacement. *Subject Headings:* **1. Wind waves 2. Ship building.**—*C.E.P.B.*

5.4–159 551.556:532.593:629.12

Hebecker, O., **Stampfen und Rollen—Stabilitätskontrolle.** [Pitching and rolling—stability control.] *Wetterlotse*, 43:129–134, Sept. **1952.** fig. **DWB**—Pitch period is nearly constant at $\sqrt{(L/3)}$ sec, L is length of ship in meters. Roll period depends on size and stability of ship and wave period, and can be controlled in various ways. *Subject Headings:* **1. Wind waves 2. Ship stability 3. Marine navigation.**—*C.E.P.B.*

5.4–160 551.556:551.461.2

Hidaka, Koji, **A contribution to the theory of upwelling, Part II. The most favorable condition for upwelling and the coastal currents induced by winds.** Texas. Agricultural and Mechanical College. Dept. of Oceanography, Contract N7onr-48702, Project NR 083 036, Project 24, [unnumbered report], Aug. **1953.** 10 p. 6 figs., 5 tables, refs., 22 eqs. **DWB**—In Technical Report No. 6 of this project the author showed the possibility of upwelling induced by a wind blowing parallel to the coast in such a manner that, in the Northern (Southern) Hemisphere, the coast is on the left-hand (right-hand) side of an observer who looks in the direction of the wind. In this report he shows that an offshore wind blowing perpendicular to the coast can also give rise to a similar circulation in the same vertical plane, but in this case with much weaker intensity. From this result it can be concluded that the most intense upwelling will occur when the wind makes an angle of 21.5° with the coast line in an offshore direction. In addition to these circulations in the vertical plane there exist horizontal currents parallel to the coast. These will contribute to the formation of the coastal or longshore currents much debated recently. The horizontal components of the motion under consideration show a vertical variation very similar to the Ekman spiral at same distance from the coast. *Subject Headings:* **1. Upwelling 2. Wind driven currents. I. Texas. Agricultural and Mechanical College. Dept. of Oceanography II. Contract N7onr-48702.**—*Author's abstract.*

5.4–161 551.556:69:34

Marini, M., **Étude de quelques problèmes posés par l'action du vent.** [Study of some problems presented by wind action.] *France. Ministère de l'Air, Publications Scientifiques et Techniques*, No. 251: 5–9, **1951.** **DWB**—In promulgating laws or regulations governing the strength or design of buildings and other structures (towers, hangars, warehouses, transmission lines, reservoirs, etc.) problems have arisen due to the greater size and lighter (though just as strong) types of material used today in construction. Engineers are studying effects of heat, wind, and rain or snow, and the effects of wind are of particular concern to aerodynamicists. The task is to furnish to the Commission for Snow and Wind Laws the data necessary to formulate these laws in the light of scientific and technological advances, to conduct scientific research, to increase our knowledge of these phenomena, and to establish a laboratory to give prompt answers to questions on particular cases which might arise in construction; a plan for a wind tunnel to test construction models and materials is elaborated. *Subject Headings:* **1. Engineering meteorology 2. Building construction laws 3. Wind load on structures.**—*M.R.*

5.4–162 551.556.3:621.311.24

Rogiński, Stefan, **Wykorzystanie energii wiatru.** [Utilization of wind energy.] *Gazeta Obserwatora PIHM*, Warsaw 4(6):8–14, June **1951.** 13 figs. **DLC**—After having given some basic theoretical information on the nature and dynamics of winds, the author presents a historical outline of the consecutive development and technical improvements achieved recently in utilization of wind energy for diverse industrial purposes but mainly for wind mills and power generating wind turbines. The details of various models of European, American and Soviet design are described and shown in photographs or drawings and their efficiency and peculiarities are considered. *Subject Headings:* **1. Wind utilization 2. Wind power stations.**—*A.M.P.*

UPPER AIR WINDS AND VERTICAL MOTION

See also: **Mechanism of pressure disturbance** (Isozaki), 5.4–147.

5.4–163 551.557:551.513.2

Johnson, D. H., **The jet stream. Parts I and II.** *Weather*, 8(9, 11):270–274; 325–329, Sept., Nov. **1953.** 7 figs., 7 refs. **MH-BH**—I. Describes early observations of jets, structure and relations to upper temperature field and to tropopause. II. British Isles are described. Jan. 16, 1950, double maximum; Sept. 16, 1950, strong horizontal wind shear; Sept. 1, 1950, jet distorted by eddies. Relations to surface weather are complex; the main importance is in aviation, including clear air turbulence. The definition of a jet stream is discussed but no rigid definition can be found. *Subject Heading:* **1. Jet stream.**—*C.E.P.B.*

5.4–164 551.557:629.1

*Phillpot, H. R. and Reid, D. G., **Equivalent headwinds on Australian air routes.** *Australia. Meteorological Branch, Bulletin*, No. 41, May **1952.** 24 p. 2 figs., table, 6 refs. **DLC**—The equivalent headwind, introduced by SAWYER (*see item* 2.1–21, Jan. 1951, *MAB*) is the difference, over the flight, between the air speed and ground speed of an airplane. Mean headwind velocities and their standard deviations in each season are given for 35 air routes separately for 100, 200, 300, 500 and 700 mb. It is shown how to estimate, by means of an arithmetic probability paper, how often the equivalent headwind will exceed a given value. An abnormal wind distribution is found only in the jet stream region, where directly observed values should be used. *Subject Headings:* **1. Equivalent headwinds 2. Upper air winds 3. Aeronautical meteorology 4. Australia.**—*A.A.*

5.4–165 551.557:551.542.5

Porter, Elizabeth M., **The westerly wind flow at 300 mb. across Australia and New Zealand.** *New Zealand. Meteorological Office, Technical Note*, No. 98, July 6, **1953.** 2+p. 5 figs., 4 tables. **DWB**—The westerly components of geostrophic wind flow at 300 mb across the Australia–New Zealand region between latitudes 20°S and 50°S during the years 1951–5

are presented in the form of seasonal frequency distributions of the components in five degree latitude zones, both across the whole region and across the meridian 170°E. Strong zonal winds indicative of the presence of jet streams occur principally in winter in the latitude zones between 20°S and 35°S. *Subject Headings:* **1. Geostrophic winds 2. Jet stream 3. Australia 4. New Zealand.**—*Author's abstract.*

5.4–166 551.557:551.542.1

Roulleau, J. (*Établ. d'Études et de Recherches Mét., Paris*), **L'altitude de la base de l'atmosphère libre au-dessus de l'océan.** [Height of the base of the free atmosphere above the ocean.] *Journal Scientifique de la Météorologie*, Paris, 4(16):135–142, Oct./Dec. **1952.** 3 figs., table, 5 refs. French, English and Spanish summaries p. 135. **DWB**—Analysis of 283 wind aloft soundings, made in 1951–52 at Weather Ship "K" (45°N, 16°W) in the Atlantic, according to direction of wind, shows variation of mean height of gradient wind level "h" from 300 m for winds from N to E and 400–430 m for SSE to WNW winds. Deutsche Seewarte data (1927–33) and "Meteor" kite ascents (1925–27) show heights varying from 200 m to 500 m in different latitudes or longitudes of the Atlantic (14°–47°N and 13° to 50°W). A regular variation in "h" with latitude and an irregular variation from day to day are noted. "h" seems to vary inversely with the sine of the lat. *Subject Headings:* **1. Gradient wind level variations 2. Weather ship data 3. North Atlantic.**—*M.R.*

5.4–167 551.557

Venkiteshwaran, S. P., **Winds at 10 Kms. and above over India and its neighbourhood.** *National Institute of Sciences of India, Proceedings*, 16(1):19–27, Jan./Feb. **1950.** 7 figs., 5 refs. Abstracted from reprint. **DWB**—Charts based on all available data from 1920 to 1941, show wind streamlines for every 2 km from 10 to 20 km. In all levels westerlies were observed during the winter, and easterlies were observed during the summer monsoon. Meridional cross sections giving the location of the tropopause, the jet stream and the easterlies show a remarkable similarity to an analysis of gradient winds made by BJERKNES and others in 1933. *Subject Headings:* **1. Upper air winds 2. Indian monsoon 3. Tropospheric cross sections 4. India.**—*A.A.*

5.4–168 551.558:551.551:551.508.59

Frankenberger, Ernst, **Über vertikale Luftbewegungen in der untersten Atmosphäre.** [On vertical air motion in the lowest atmosphere.] *Annalen der Meteorologie*, 5(7/12):368–372, **1952.** 4 figs., table, 2 refs., 8 eqs. Discussion p. 371–372. **MH-BH**—A new instrument for recording vertical wind is described, consisting of a very light balsa wood funnel free to move about 2 axes. Examples of records in turbulent and convective air are shown. The influence of the average horizontal wind velocity and the vertical thermal structure at 10 and 72 m height on vertical turbulence is studied. *Subject Headings:* **1. Vertical motion 2. Turbulence measurement.**—*C.E.P.B.*

5.4–169 551.558.21:629.13

Frederickson, Paul S., **Eddy winds and sustained downdrafts.** *Trans World Airlines, Inc., System Operations Bulletin*, No. 51–9, Feb. 7, **1951.** 1 p. diagrs. Mimeo. **DWB**—Sustained and possibly dangerous eddies or downdrafts may occur where a bluff or a ridge exists near a runway, such as is the case at the Cincinnati, Albuquerque, Kansas City, Lagens (Azores), Stephensville (Newfoundland), Geneva, Zurich and Bombay airports which are on TWA routes. The eddies vary with direction and speed of wind in relation to orientation of a given runway. Surface turbulence may be severe when stray winds prevail. A diagram shows a possible position of the eddy or downdraft with respect to the obstacle. *Subject Headings:* **1. Orographic effects 2. Lee eddies 3. Downdrafts near airports.**—*M.R.*

5.4–170 551.558.21:551.43

Georgii, Walter (*Univ. Nacional de Cuyo, Mendoza, Argentina*), **El problema del vuelo a vela sobre ondas en la Cordillera de Mendoza.** [The problem of wave gliding in the Mendoza Cordillera.] *Revista Nacional de Aeronautica*, Buenos Aires, 11(117):16–19, 52–56, Dec. **1951.** 26 figs. **DWB**—Account of scientific expedition to the Mendoza Cordillera. The

formation of lee waves and of specific orographic clouds is explained, emphasizing the distribution of vertical velocities. *Subject Headings:* **1. Lee waves 2. Orographic effects 3. Mendoza Cordillera, Argentina.**—*A.A.*

AQUEOUS VAPOR AND HYDROMETEORS

HUMIDITY

See also: **Mean hourly temp. and humidity, Lisbon Airport** (Portugal Met. Serv.), 5.4–137.

5.4–171 551.57:551.515.1

§†Cunningham, Robert M., **Distribution and growth of hydrometeors around a deep cyclone.** Massachusetts Institute of Technology. Dept. of Meteorology. Contract DA-36-039-sc-124, Project DA 3-99-05-022, Technical Report, No. 18, May 9, **1952.** 59 p. 47 figs., 6 tables, 37 refs. **DWB**—A complete analysis made for a single storm (April 3, 1951) by means of an instrumented aircraft and radar precipitation echoes. Results compared with those from other storms. Author presents surface and upper level charts, gives numerous cross section, based on aircraft soundings, compares radar photographs with recorded precipitation and computes the growth of hydrometeors during their fall, considering fall velocity, sublimation, evaporation, coalescence, etc. *Subject Headings:* **1. Cyclone structure 2. Hydrometeors 3. Drop accretion 4. Cloud physics 5. Radar precipitation echoes. I. Massachusetts Institute of Technology. Dept. of Meteorology II. Contract DA-36-039-sc-124.**—*A.A.*

5.4–172 551.571.1:551.574.1

Dufour, Louis, **De oppervlaktespanning van een wolkendruppel.** [The surface tension of a cloud droplet.] (*K.*) *Vlaamsche Academie voor Wetenschappen, Lettern en Schoone Kunsten van Belgie. Klasse der Wetenschappen, Mededeelingen*, 13(14), **1951.** 12 p. refs., 25 eqs. In Flemish; French summary p. 11–12. **DLC**—Theoretical study based on GIBB's formula for the increase in surface tension, dependent on thermal, mechanical and chemical processes in a droplet, consisting from a saline solution. *Subject Headings:* **1. Cloud droplets 2. Surface tension of droplets.**—*A.A.*

5.4–173 551.571.2(261/3)

Brown, P. R., **Humidity over the Atlantic Ocean.** *Meteorological Magazine*, London, 82(978):357–364, Dec. **1953.** 4 figs., 3 tables, 8 refs. **MH-BH**—Accurate humidity statistics for each month computed for 11 10-degree squares between 60°N and 10°S are set out in tables of means and standard deviations of vapor pressure, means and medians of relative humidity. Annual harmonic variation illustrated. Results are compared with those of SZAVA-KOVATS and "Meteor." *Subject Headings:* **1. Humidity distribution 2. Atlantic Ocean.**—*C.E.P.B.*

5.4–174 551.573

*Bac, Stanisław, **Transpiration des végétaux de prairies et évaporation des sols non-couverts. Étude basée sur des observations en lysimètres sur le niveau effectif de la nappe souterraine.** [Transpiration of grass vegetation and evaporation from bare soils. Study based on lysimeter observations of the effective ground water level.] *I.U.G.G. International Association of Scientific Hydrology, Oslo 1948, Transactions*, v. 1:65–74, [n.d.] 5 figs., 6 tables. **DWB**—Study based on lysimeter observations with variable ground water level near the bank of the Łacha river (Puławy, 51°25′N, 21°57′E). Observational data for different soils cover the months April–Sept. 1939–1943. Transpiration from grass cover (640–800 mm) was considerable higher than measured precipitation (390 mm). Summer evaporation for soil 280–460 mm dependent on the kind of soil. *Subject Headings:* **1. Evapotranspiration 2. Evaporation from soil 3. Lysimeters 4. Puławy, Poland.**—*A.A.*

5.4–175 551.573:63

Hesse, Walter, **Meteorologische Einflüsse bei der Pflanzentranspiration.** [Meteorological influences in plant transpiration.] *Annalen der Meteorologie*, 5(7/12):194–201, **1952.** 7 figs., 2 tables, 20 refs. German and English summaries p. 194. **MH-BH**—Using a new type of small lysimeter, the transpiration of summer wheat and millet was observed on the same plants throughout the growing period of 1950. Other weather data were obtained on the same site. Results shown graphically include diurnal variations on 2 days and day to day variations in June and July. *Subject Heading:* **1. Evapotranspiration.**—*C.E.P.B.*

5.4–176 551.573

Priestley, C. H. B., **Meteorological aspects of soil and crop evaporation.** (In: Specialist conference on plant and animal nutrition in relation to soil and climatic factors, Australia, **1949, Proceedings.** Pub. 1951. p. 35–42. refs.) **DWB**—Evaporation measurements are applicable to studies of the role of evaporation in plant weather relationships and for establishing a climatic index for representing the suitability of an area for a particular crop. The mechanism of evaporation is described as depending upon the characteristics of eddy motion. The distinction between the hydrolapse (decrease of specific humidity with height above the ground) and saturation deficit lies in the fact that the former can be both positive and negative while the latter implies unidirectional transfer of water vapor. The use of hydrolapse for plant weather studies is stressed. Tank evaporation data can be used to "assess the evaporating power of the air" by means of general formula $E_r = cxs \cdot dxf(U)$ (c—constant depending upon nature of vegetation, U—wind velocity). The use of principles of energy balance to tank evaporation measurements and the application of the inferential aerodynamic method based on vertical wind and humidity profiles, to soil measurements based on humidity profiles in depth and measurement of increased flux of vapor made in the air close to the surface to measure evaporation are discussed. *Subject Headings:* **1. Hydrolapse 2. Evaporation measurement 3. Evaporation from soil 4. Evaporative energy.**—*I.L.D.*

CONDENSATION AND DEPOSITS

See also: **Dew evaporation from funnel of rain gage** (Gold), 5.4–22; **Natural and artificial rain production** (Mason), 5.4–72; **Oversaturation of a cloud droplet** (Dufour), 5.4–172.

5.4–177 551.574.1

SHishkin, N. S., **Nekotorye fizicheskie zakonomernosti fazovykh prevrashcheniĭ gidrometeorov.** [Some physical regularities of the phase transformation of hydrometeors.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 1:78–82, **1953.** 4 refs., 8 eqs. **DLC**—Critical conditions of atmospheric temperature and relative humidity determining the phase transformation of water into ice particles and the thawing of the latter were obtained. The value of the threshold of thawing of the particles and of the threshold of freezing of water drops was determined for absolutely dry air. *Subject Heading:* **1. Cloud physics.**—*I.L.D.*

5.4–178 551.574.1

Woodcock, A. H., Kientzler, C. F., Arons, A. B. and Blanchard, D. C., **Giant condensation nuclei from bursting bubbles.** *Nature*, London, 172(4390):1144–1145, Dec. 19, **1953.** 2 figs., 6 refs. **DWB**—Photographs of bursting bubbles at Woods Hole Oceanographic Institution show formation of jets of droplets ½–15 cm up into the air. Evaporation of these leaves salt nuclei in the air. *Subject Headings:* **1. Saline nuclei. I. U. S. Office of Naval Research II. Contract NONR-798(00).**—*C.E.P.B.*

5.4–179 551.574.7:533.6

Brun, Rinaldo J., Serafini, John S. and Gallagher, Helen M. (*Lewis Flight Propulsion Lab., Cleveland, Ohio*), **Impingement of cloud droplets on aerodynamic bodies as affected by compressibility of air flow around the body.** *NACA, Technical Note*, 2903, March **1953.** 20 p. 6 figs., 4 eqs. **DWB**—The trajectories of water droplets in a compressible air flow field around a cylinder were computed with a mechanical analog. The results of the calculations at the flight critical Mach number were compared with calculations of trajectories in an

incompressible flow field. For a cylinder, the effect of compressibility of the air on the droplet trajectories was negligible up to the flight critical Mach number. The results obtained with the cylinder were extended to airfoils. This extension is possible because the incompressible flow fields of both cylinders and airfoils are similarly altered by compressibility. *Subject Headings:* **1. Aerodynamic theory 2. Icing of aircraft.**—*NACA abstract.*

5.4–180 551.574.7

Brun, Rinaldo J., Gallagher, Helen M. and Vogt, Dorothea E. (*Lewis Flight Propulsion Laboratory, Cleveland, Ohio*), **Impingement of water droplets on NACA 65_1-208 and 65_1-212 airfoils at 4° angle of attack.** *NACA, Technical Note*, 2952, May **1953.** 49 p. 16 figs., 15 refs. **DWB**—The trajectories of droplets in the air flowing past an NACA 65_1-208 airfoil and an NACA 65_1-212 airfoil, both at an angle of attack of 4°, were computed with a mechanical analog. The amount of water in droplet form impinging on the airfoils, the area of droplet impingement per unit area on the airfoil surface affected were calculated from the trajectories. *Subject Heading:* **1. Icing of aircraft.**—*NACA abstract.*

5.4–181 551.574.7:629.13

Dixon, William A., **Winter is the worst.** *Flying*, New York, 53(3):18–19, 48–50, Sept. **1953.** photos. **DWB**—Icing of wings, windshields, antennas and props comprises the most serious hazard to flying, especially in winter which is the worst time of the year for flying (in spite of lack of thunderstorms). Hints for avoiding icing and statistics on frontal temperature and cloud condition most likely to be accompanied by ice are included. *Subject Headings:* **1. Icing of aircraft 2. Aeronautical meteorology.**—*M.R.*

5.4–182 551.574.7:533.607

*Takano, Tamakichi, **Studies on ice formation with a wind channel, Pt. I-V.** *Low Temperature Science*, Sapporo, Japan, v. 5:1–60, **1950.** figs., tables, refs. In Japanese; English summary at end of each part. **DWB**—Pt. I entitled "Construction and efficiency of the wind channel" (p. 1–8) discusses and illustrates formation at summit of Mt. Niseko. Air containing snow and fog is pulled into L-type channel at up to 100 m/sec. Pt. II is on "Ice formation on wing models in the wind channel" (p. 9–20). Five kinds of wings were used and ice distribution as function of temperature, fog density, wind speed and angle of impingement studied and illustrated. Pt. III is on "Difference of method" (p. 21–36), Pt. IV on the same (p. 37–50), where different materials and wind speeds were used. Pt. V "Arresting factor and dimension of body" (p. 51–60) on the relation of size of body to arresting factor of fog particles. ALBRECHT's theory was compared with experimental results and found to hold for only a narrow range of meteorological conditions. *Subject Headings:* **1. Icing of aircraft 2. Ice formation 3. Wind tunnel experiments.**—*M.R.*

FOG

5.4–183 551.575:551.551:551.588.6

Hori, Jun-ichi, **On the diffusion by turbulent motion near a forest and its effect upon the capture of fogs by the forest.** (In: Sapporo, Japan. Hokkaido Univ. Institute of Low Temperature Science, **Studies on fogs in relation to fog-preventing forest. 1953.** p. 113–135. 4 figs., 9 refs., 44 eqs.) **MH-BH**—A review of various studies on the role of diffusion of fog particles by turbulent flow in the disappearance of advective fog in the vicinity of forests, leads to the conclusion that the diffusion coefficient of small eddies is a measure of the contribution of these eddies to the capturing effectiveness of forests. The diffusion coefficient due to eddies of finite size is defined by treating the successive position of a particle as a stationary time series that can be considered approximately as a superposition of several elementary Brownian motions all in stationary states and the characteristics of these motions—their number, frequencies, damping constants, etc.—can be determined from the observed stochastic variations of position or velocity. It is shown that the diffusion coefficient of each eddy can be derived from the characteristics of elementary Brownian movement which are the actual manifestations of the eddies. *Subject Headings:* **1. Advection sea fog 2. Turbulent diffusion 3. Forest influences 4. Fog capture.**—*I.L.D.*

5.4–184 535.36:551.575

Oura, Hirobumi, **Diffusion of light by fog.** *Low Temperature Science*, Sapporo, Japan 3:123–130, **1950.** 5 figs., 8 refs. In Japanese; English summary p. 130. **DWB**—Artificial fog with diameter 1 to 6μ produced by condensation and 5–30μ produced by spraying liquid water, was used to determine the intensity of small angle diffusion in a spectrograph from a bundle of monochromatic light from a mercury lamp source. The intensity distribution proved to be same as that calculated theoretically for diffraction from opaque discs with same diameters. For large angles (20°–160°) geometrical refraction and reflection data can be used, thus for natural fog it is possible to compute intensity distribution for entire range 0–180°, using disk formula for small angles. *Subject Headings:* **1. Small angle diffusion 2. Diffusion by fog 3. Light intensity.**—*M.R.*

5.4–185 551.575:551.510.42

Wilkins, E. T., **Air pollution and the London fog.** *Smokeless Air*, 88:89–92, Winter **1953. DLC**—Report of paper at Royal Sanitary Institution, Nov. 11, 1953, on frequency and extent of London fogs since 1873. The chemistry of London fog is discussed fully. Among factors considered are possible oxidation of SO_2 to SO_3 by ozone from electrostatic dust-collecting installations, and effect of all-night banked up open fires in increasing smoke. Prevention of smoke by using smokeless fuels would decrease effect of sulfur, which is more difficult to remove. *Subject Headings:* **1. Smog 2. London, England.**—*C.E.P.B.*

CLOUDS

See also: **Cumulus cloud investigations** (Day, Murgatroyd), 5.4–28; **Cloud funnel, S. Scotland** (Phillips), 5.4–108; **Radiation from overcast sky at night** (Raman), 5.4–129.

5.4–186 551.576(04)

Siegel, Rolf, **Sprache der Wolken.** [The language of clouds.] Stuttgart, Kosmos, **1949.** 79 p. 70 figs. **DLC**—A semipopular discussion, leading to a good understanding of the physical features of cloud formation and precipitation. Covers thunderstorms, shower clouds, radiation from clouds, wind effects, orographic influences, ground layer clouds, air masses, cyclonic, anticyclonic and frontal clouds. *Subject Headings:* **1. Clouds 2. Popular meteorology.**—*A.A.*

5.4–187 551.576.1

Unusual cloud formations. South Indian Ocean. *Marine Observer*, 23(160):76, April **1953.** 2 figs. **DWB**—May 31, 1952, towering Cu bearing 34° and 214° appeared to be joined by a narrow band of Cicu. A similar formation was seen on June 3, 1952. *Subject Headings:* **1. Cumulus clouds 2. South Indian Ocean.**—*C.E.P.B.*

PRECIPITATION

See also: **Precip. measurement in mountains** (Grunow), 5.4–26; **Natural and artificial rain production** (Mason), 5.4–72; **Mean temp. and precip., Turkey** (Turkey Met. Serv.), 5.4–132; **Palaeometeorology** (Dury), 5.4–224.

5.4–188 551.577.36

McConalogue, D. J., **On the distribution of rainfall rates at some coastal stations in the British Isles.** *Meteorological Magazine*, London, 82(976):304–306, Oct. **1953.** 2 figs., table, eqs. **MH-BH**—Cumulative frequency curves of rates of rainfall R exceeding 0, 1 . . . 10 mm/hr at Lerwick, Ronaldsway, St. Eval and Valentia can be closely fitted by exponential curves of the type $\frac{P_o}{R_o}e^{-R/R_o}$; P_o = percentage of time when rain of any intensity is falling, R_o = average rate of rainfall mm/hr. *Subject Headings:* **1. Rainfall depth-duration frequencies 2. British Isles.**—*C.E.P.B.*

5.4–189 551.577.37

Alldis, V. R., **1950 abnormal rainfall.** *The Pastoral Review and Grazers' Record*, 60(10), Oct. 16, **1950.** 1 p., chart. Abstracted from reprint. **GB-MO**—Rainfall Jan.–June 1950

was greatly in excess (up to 370% of normal) in southern Queensland and New South Wales. Tasmania and western half of Australia had deficient rains. *Subject Headings:* **1. Excessive rainfall 2. Queensland, Australia 3. New South Wales, Australia.**—*C.E.P.B.*

5.4–190 551.577.37

Azevedo, Ário Lobo, **Curvas de frequência das quedas pluviais de grande intensidade em Luanda.** [Frequency curves of rainfall of great intensity at Luanda.] *Agronomia Angolana*, Luanda, No. 6:145–165, **1952.** In Portuguese; French and English summary p. 165. **DWB**—Study based on observations from 1941–51. Intense rainfall determined by $i>0.08t+4.2$ (t in minutes). Author applies formula $y=ax^n$; y—intensity in mm/h; x—frequency, expressed in years, a and n given as a function of rainfall duration from 10 to 300 min. The maximum possible rainfall occurring once in 1 to 25 years is computed, as well as the intensity in $l.ha^{-1}.sec^{-1}$. Only formulas and curves are presented, but not the results of observations. *Subject Headings:* **1. Rainfall intensities 2. Luanda, Angola.**—*A.A.*

5.4–191 551.577.5:551.588.6(47)

*Eitingen, G. R., **Zaderzhanie osadkov pologom lesa.** [Interception of precipitation on the canopy of forests.] *Les i Step'*, Moscow, 8:7–16, **1951.** 2 tables, 2 photos. **DLC**—Data are presented from one of the largest series of observations (1908–40) on interception. From 545 mm annual precipitation, observed in an open field, 32% was intercepted by a fir forest, 14% by pine, and 9% by birch. Data, including standard deviation, are given also for each season (for example the fir forest intercepts 15%, birch practically nothing in the winter). Another table shows the percentage of rainfall (May to Oct.) intercepted by the canopy, dependent on the intensity of the rain (fir: 70% for low intensity down to 20% for rainfall of high intensity). Fourteen percent more precipitation (39% in the winter) was observed in a clearing, than in the open field. *Subject Headings:* **1. Precipitation interception 2. Forest influences 3. Moscow District U.S.S.R.**—*A.A.*

5.4–192 551.577.38

§Ganev, G. and Kr'stanov, L., **Prinos k'm meteorologichnoto izsledvane zasushavaniiata v B'lgariia.** [A contribution to the meteorological investigation of drought in Bulgaria.] *Bulgarska Akademiia na Naukite, Sofia, Izvestiia, Ser. Fizicheska*, 2:255–280, Jan./Dec. **1951.** 13 figs., 5 maps (fold.), 2 tables, 8 refs. Russian and English summaries p. 269–272. **DLC**—Data for 50 evenly distributed stations in Bulgaria for the period 1896–1949 are analyzed to show frequency, duration and local distribution of drought in the various seasons. Drought is defined as a period of at least 10 days without precipitation. Drought occurs most frequently in autumn, then in summer, then winter and least often in spring. Composite isobaric charts are prepared for the most serious droughts. In several cases the mean pressures are shown for several phases of the drought cycle. Several drought types are differentiated: (a) Extension of Azores anticyclone to cover Central Europe; (b) North Sea anticyclone extended forward to Balkans; (c) NE type with anticyclone over continental U.S.S.R.; (d) Combinations of these types. The SE plains along the Black Sea are the most subject to drought although other scattered areas show high frequency. *Subject Headings:* **1. Drought 2. Synoptic conditions for drought 3. Bulgaria.**—*M.R.*

RAIN AND SNOW

See also: **Long wave radiation from snow** (Hering), 5.4–121.

5.4–193 551.578.11:551.501:629.135

*Dorsch, Robert G. and Brun, Rinaldo J., **Method for determining cloud-droplet impingement on swept wings.** *U. S. NACA, Technical Note*, 2931, April **1953.** 29 p. 8 figs., 8 refs., eqs. **DWB**—The general effect of wing sweep on cloud-droplet trajectories about swept wings of high aspect ratio moving at subsonic speeds is discussed. A method of computing droplet trajectories about yawed cylinders and swept wings is presented, and illustrative droplet trajectories are computed. A method of extending two dimensional calculations of droplet impingement on nonswept wings to swept wings is presented. It is shown that the

extent of impingement of cloud droplets on an airfoil surface, the total rate of collection of water, and the local rate of impingement per unit area of airfoil surface can be found for a swept wing from two-dimensional data for a nonswept wing. The impingement on a swept wing is obtained from impingement data for a non-swept airfoil section which is the same as the section in the normal plane of the swept wing by calculating all dimensionless parameters with respect to flow conditions in the normal plane of the swept wing. *Subject Headings:* **1. Drop impingement measurement.**—*NACA abstract.*

5.4–194 551.578.11

Rigby, E. Caroline and Marshall, J. S., **Modification of rain in showers with time.** McGill Univ. Macdonald Physics Laboratory. Stormy Weather Research Group, Contract AF 19(122)-217, Scientific Report MW-10, March **1953.** 40 p. figs., tables, 7 refs., eqs. **DWB**—Changes in the drop-size distribution during showers are analyzed theoretically and compared with observational data. The theory of radar measurement of showers, and radar echoes obtained with the RCAF Microwave Height Finder installed at Ottawa are discussed. *Subject Headings:* **1. Rainfall structure 2. Radar precipitation echoes. I. McGill Univ. Macdonald Physics Laboratory II. Contract AF 19(122)-217.**—*G.T.*

5.4–195 551.578.11

SHishkin, N. S., **O razmere kapel' dozhdia.** [The size of rain drops.] *Akademiia Nauk SSSR, Doklady*, 90(2):171–174, May 11, **1953.** 4 figs., 5 refs., 6 eqs. **DLC**—Discusses theoretical dependence of raindrop sizes on the velocity of ascending currents in clouds consisting of water droplets, assuming the rate of growth is determined by condensation and gravitational coagulation. Graphical solution presented. Evaporation of droplet and growth of frozen particles is not discussed. Contrary to BERGERON and FINDEISEN, the author assumes that ice particles are not necessary for the initiation of rain. *Subject Headings:* **1. Raindrop sizes 2. Cloud physics 3. Raindrop growth.**—*A.A.*

5.4–196 551.578.11:551.501.81

Styles, R. S. and Campbell, F. W. (*Div. of Radiophysics, C.S.I.R.O., Univ. Grounds, Sydney*), **Radar observations of rain from non-freezing clouds.** *Australian Journal of Physics* Melbourne, 6(1):73–85, March **1953.** 6 figs., table, 6 plates, 10 refs. **DLC**—It is now conceded that drizzle or light rain may fall from clouds which do not reach freezing level, but it is still not generally accepted that heavy precipitation is also possible from such clouds. This paper adds five further airborne radar observations of non-freezing rain (in the vicinity of Sydney, Australia; latitude 35°S.) to the relatively few accounts of moderate to heavy precipitation already recorded as falling from such clouds. Observations described are of rain, which at its peak reached "very excessive" proportions at ground level, falling from clouds, 9000–10,000 ft. deep, which had developed in a maritime air mass either over sea or slightly inland. The shape of the radar echo observed from the rain in these clouds was that of a vertical column. The radar echo reached its maximum development at or just prior to the time of maximum development of the cloud, following which both the cloud and the radar echo immediately commenced to subside or dissipate. Maximum precipitation rate at ground level generally occurred after the cloud had passed its maximum development. While the storm was developing the radar echo was generally characterized by a maximum in the middle levels of the cloud, but during the decay stage the radar echo became more uniform with height. These observations support the theory that the mechanism of rain formation at work in such clouds is that of coalescence of water drops. *Subject Headings:* **1. Rain from non-freezing clouds 2. Radar precipitation echoes 3. Raindrop coalescence 4. Sydney, Australia.**—*Authors' abstract.*

5.4–197 551.578.11 551.510.41:541.4:546.17

Virtanen, Arturi I. (*Biochemical Inst., Helsinki, Finland*), **Molecular nitrogen fixation and nitrogen cycle in nature.** *Tellus*, 4(4):304–306, Nov. **1952.** fig., 11 refs. **MH-BH**—The NH_2–N in precipitation originates from the soil. NO_3–N and NO_2–N present in rain water are produced by fixation caused by the action of electric discharges on molecular nitrogen.

It is however, quite possible that most of the N_2 fixation in the atmosphere is photochemicall and the conditions for this fixation probably exist in the ozonosphere. Also some of the NO_3–N of the atmosphere may be formed through oxidation of NH_4–N. Man's industriall activity contributes nitrogen to the atmosphere. *Subject Headings:* **1. Atmospheric composition 2. Nitrogen compounds 3. Rain water analysis.**—*I.L.D.*

5.4–198 551.501:551.578.46:551.579.2

Dhir, R. D., **The feasibility of snow survey in the Himalayas.** *I.U.G.G. International Association of Scientific Hydrology, Brussels, 1951, Transactions*, 1:305–314, **1952.** 4 tables. **DWB**—Extensive snow surveys in Himalayan catchment areas, in order to study the possibility of runoff forecasting, gave rather disappointing results, mainly due to the inaccessibility of the higher regions and the small relative amount of snow melt runoff. Detailed sample computation given for the accumulation, evaporation and melting of snow in different altitudinal zones for one catchment area. Contribution from snow melt to river runoff is shown for 8 areas. *Subject Headings:* **1. Snow melt runoff 2. Snow surveys 3. Himalayas, India.**—*A.A.*

5.4–199 551.501:551.578.46(481)

Klaeboe, H., **Snow investigations in Norway.** *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951, Transactions*, 1:315–318, **1952.** 5 graphs. **DWB**—The total spring time flood can be predicted with astonishing accuracy on the basis of snow surveys if the precipitation during the melting period is considered. The water losses during this period equal only 50–60 mm. Mean areal snow depths up to 3.30 m have been found. Snow measurement stations can be reduced to 4–5, but the relations to the areal mean should be known. Some results are presented for the Aursund and Tysso catchment areas. *Subject Headings:* **1. Snow surveys 2. Snow melt floods 3. Aursund Catchment, Norway 4. Tysso Catchment, Norway.**—*A.A.*

5.4–200 551.501:551.578.46(71)

*Pearce, D. C. and Gold, L. W., **The Canadian snow survey 1947–1950.** *I.U.G.G. Association of Scientific Hydrology, Brussels, 1951, Transactions*, 1:277–304, **1952.** 8 figs., tables, 8 refs. **DWB**—Report on snow surveys, conducted by the Canadian Committee for Soil and Snow Mechanics at 13 places, covering Canada up to 68°N. Set of instruments known as the "Canadian Snow Kit" for the measurement of water content, hardness, grain size and shape is described and a snow classification presented. Weather and snow conditions are summarized for each place, and tables showing monthly averages for the amount and frequency of total precipitation and snowfall, as well as for humidity, temperature and wind speed are added. *Subject Headings:* **1. Snow surveys 2. Snow properties 3. Climatic data 4. Canada.**—*A.A.*

HYDROMETEOROLOGY

See also: **Met. situation and flood, Sardinia, Oct. 1951** (Serra), 5.4–69; **Snow survey in Himalayas** (Dhir), 5.4–198.

5.4–201 551.579

Boldakov, E. V., **Livnevoĭ stok s malykh basseĭnov.** [Storm runoff from small basins.] *Gidrotekhnika i Melioratsiia*, Moscow, No. 3:18–24, **1952.** 4 figs., 3 tables. Discussion by IU. E. Kazarnovskiĭ, *ibid.*, p. 70–72. **DLC**—Computation of maximum possible runoff from small basins analyzed taking into account the accumulation of water on slopes and in the water channels, water losses on interception and infiltration, as well as topographical characteristics of the catchment area. Construction of hydrographs discussed. Paper summarizes also some official recommendations of government institutions. *Subject Headings:* **1. Runoff 2. Catchment basins 3. U.S.S.R. I. Kazarnovskiĭ, IU. E.**—*A.A.*

5.4–202 551.579(261.3

†*Brogmus, Willi, **Eine Revision des Wasserhaushaltes der Ostsee.** [A revision of the calculation of water balance in the Baltic Sea.] *Kieler Meeresforschungen*, Kiel, 9(1):15–42, **1952.** 14 tables, 3 figs. (fold.), 31 refs. **DWB**—One of the most difficult problems in computin

the water balance of seas, is the distribution of precipitation over the sea. The author presents precipitation maps over the Baltic Sea for summer, winter and the year, assuming a considerable gradient from the coast to the sea. The annual and seasonal discharges from rivers are summarized, and the evaporation over the sea is computed by the turbulence formula of SVERDRUP for water and ice surfaces and with the aid of the water balance, considering in- and outflow through the Belts. Separate monthly and annual water balance values are computed also for 8 parts of the sea. The annual amount of precipitation (474 mm) equals the evaporation. Runoff into the sea results in 1240 mm. *Subject Headings:* **1. Hydrologic cycle 2. Precipitation charts 3. Baltic Sea.**—*A.A.*

5.4–203 551.579

†Bykov, V. D., **Istoricheskie puti razvitiia v SSSR ucheniia o stoke.** [History of the development of runoff studies in the U.S.S.R.] *Voprosy Geografii*, Moscow, No. 26:19–34, **1951.** refs., bibliog. p. 33–34. **DLC**—Concise literature survey presenting a list of 55 basic Russian papers on runoff and related subjects. Topics covered: Hydrographic and hydrological surveys, runoff and river load data, maximum flood runoff, climatic and topographic influences, classification, evapotranspiration from large areas, theory of hydrologic cycle, etc. Two papers of S. D. MURAVEĬSKIĬ (born 1894, died 1950) discussed in detail (theory of runoff from the geographical point of view). *Subject Headings:* **1. Runoff research 2. Hydrologic cycle 3. U.S.S.R. I. Muraveĭskiĭ, S. D.**—*A.A.*

5.4–204 551.579:551.585.55:016

†Hills, E. Sherbon (*Melbourne Univ.*), **The hydrology of arid and sub-arid Australia with special reference to underground water.** (In: UNESCO, **Reviews of Research on Arid Zone Hydrology, 1953.** p. 179–202. 14 maps, 344 refs.) **DWB**—Discussing the hydrologic literature on Australia, the author presents small scale maps of intermittent and permanent streams, major drainage areas, climatic regions according to THORNTHWAITE's classification, annual rainfall and length of growing period. A detailed discussion of underground water conditions follows with an extensive bibliography. *Subject Headings:* **1. Hydrologic bibliographies 2. Climatic charts 3. Thornthwaite's classification 4. Arid zones 5. Underground water 6. Australia.**—*A.A.*

5.4–205 551.579:551.311.2

Schultze, Joachim H., **Neuere theoretische und praktische Ergebnisse der Bodenerosions-Forschung in Deutschland.** [New theoretical and practical results of soil erosion investigation in Germany.] *Forschungen und Fortschritte*, 27(1):12–18, July **1953.** 4 figs., 12 refs. **DLC**—Recent research in Germany is summarized and discussed. Acute erosion depends on soil type, slope, snow melt, runoff of heavy rain, wind erosion and human activities. The critical slope is 5° in fields but 20° in woodland. A calendar of erosion damage is shown and practical consequences are discussed. *Subject Headings:* **1. Soil erosion 2. Germany.** —*C.E.P.B.*

5.4–206 551.501:551.579.5

di Gléria, János, **A talajok nedvességtartalmának meghatározására szolgáló eljárások és azok alapelvei.** [Methods for determining the moisture content of soils, and their basic principles.] *Időjárás*, 56(1/4):74–76, Jan./April **1952. DLC**—Various methods of soil moisture measurement are described: 1) weighing the water, 2) determining the water's volume, 3) determining the decrease in weight due to dehydration by (a) drying chamber technique and (b) alcohol combustion technique, 4) techniques based on the chemical effect of water, 5) measuring temperature increase due to mixing with other liquid, 6) investigating changes in the concentration of liquid admixtures by (a) alcohol technique and (b) glycerine technique, 7) observing changes in hygroscopic matter placed into the soil by (a) weight increase, (b) changes in electric conductivity and (c) changes in dielectric constant, 8) measuring the capillary potential of the soil and 9) determining changes in the heat conductivity of the soil. *Subject Heading:* **1. Soil moisture measurement.**—*G.T.*

5.4–207 551.579.5:628.1

Nöthlich, Friedrich, **Aufgaben der Wasserwirtschaft.** [Problems of water economy.] *Naturwissenschaftliche Rundschau*, 6(10):411–413, Oct. **1953. DWB**—In Germany 75% of

the main water supply comes from natural or artificial ground water, hence the need to regulate it. The economic and technical problems of water supply are discussed in this essay. *Subject Headings:* **1. Underground water 2. Water resources.**—*C.E.P.B.*

5.4–208 551.501:551.579.5

Szilágyi, Tibor, **A talajnedvességmérés gyakorlati fontossága.** [Practical importance of soil moisture measurement.] *Időjárás*, 56(1/4):70–73, Jan./April **1952.** Russian and French summaries p. 124. **DLC**—General discussion of soil moisture, water balance, storage capacity of the soil, hygroscopicity of plants, the effect of plant cover on water conservation and methods of soil moisture measurement. Regular soil moisture measurements initiated in April 1952 at several stations throughout Hungary are announced (samples are taken from both cultivated and bare soil once a week at different depths down to 50 cm and once a month at 75 and 100 cm). *Subject Heading:* **1. Soil moisture measurement.**—*G.T.*

5.4–209 551.501:551.579.5:551.508.79

U. S. Forest Service. Southern Forest Experiment Station, **Soil-moisture measurement with the fiberglas instrument.** *U. S. Forest Service. Southern Forest Experiment Station, Occasional Paper* 128, Feb. **1953.** 48 p. figs., tables, refs. **DWB**—Contents: Palpant, E. H. and Lull, H. W., "Comparison of four types of electrical resistance instruments for measuring soil moisture" (p. 2–15). Comparison between plaster of paris block, fiberglas, nylon and fiberglas-gypsum. All units have about equal performance, but the fiberglas unit is the most convenient as it makes temperature corrections possible. Palpant, E. H., "Inserter for fiberglas soil-moisture units" (p. 16–20). The device, with the units inserted into the side wall of a hole, is built like a scissor-type auto jack. Palpant, E. H., Thames, John L. and Helmers, Austin E., "Switch shelters for use with soil-moisture units" (p. 21–30). Description of a wooden and a plexiglass shelter, as well as of a portable switch. Carlson, Charles A., "Moisture equilibration in natural cores during laboratory calibration of fiberglas soil-moisture units" (p. 31–39). Deals with difficulties to obtain a uniform moisture distribution in the soil sample. Reinhard, K. G., "Installation and field calibration of fiberglas soil-moisture units" (p. 40–48). Auger holes are preferred to pits. Field calibration made with mean areal moisture content. The King tube (1″) was used for taking soil samples. *Subject Headings:* **1. Soil moisture measurement 2. Soil moisture instruments. I. Palpant, E. H. II. Lull, H. W. III. Thames, John L. IV. Helmers, Austin E. V. Carlson, Charles A. VI. Reinhard, K. G.**—*A.A.*

5.4–210 551.579.5

Veihmeyer, F. J. (*Univ. of Calif., Davis*), **Use of water by native vegetation versus grasses and forbs on watersheds.** *American Geophysical Union, Transactions*, 34(2):201–212, April **1953.** 15 figs., 2 tables, 7 refs. **MH-BH**—Soil-moisture records from plots on potential range lands in California on which native vegetation, mostly woody brush species, was left intact, and from adjacent plots which were denuded by burning, were obtained for several years. Following the fire, grasses and forbs usually succeeded the brush but, with some species, several annual burnings were necessary before it was eliminated. The soil-moisture records show that the soil in the burned areas was wet to its field capacity as early and, in many cases, earlier than in the unburned ones, thus indicating that the permeability of the soil for water was not adversely affected by burning. *Subject Headings:* **1. Soil moisture 2. Water conservation 3. Soil permeability.**—*From author's abstract.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

5.4–211 551.58:581.

Beard, J. S., **The savanna vegetation of northern tropical America.** *Ecological Monographs*, 23(2):149–215, April, **1953.** 33 figs., 2 tables, bibliog. p. 213–215. **DWB**—This detailed study on the distribution of various plants in grassland regions includes a brief discussion of possible effects of climate on the development of such plants (p. 196–198). Con

sidering that savannas are found under a variety of climatic conditions the author concludes that "there is no such thing as a tropical grassland climate, and it therefore follows that the savanna is an edaphic or biotic formation." *Subject Headings:* **1. Plant ecology 2. Climatic effects 3. Tropical America.**—*G.T.*

5.4–212 551.581 551.582(861)

Londoño, Julio, **Influjo de la latitud en la climatología colombiana.** [Influence of latitude on the climate of Colombia.] *Sociedad Geográfica de Colombia, Bogotá, Boletín,* 9(2):69–75, **1951.** 4 figs. **DLC**—Since Colombia is situated between 12°30′40″N and 4°13′30.5″S, the duration of the two winters (during the passage of the sun beyond the northern and southern boundaries) is different for the northernmost and the southernmost part of the country. The mechanism of cloud and precipitation formation in various latitudes of the state is explained as a combination of the NE and SE trades, variations in the location of the I.T.C. line, and the different zenithal positions of the sun. *Subject Headings:* **1. Tropical climates 2. Climate of Colombia 3. Trade winds 4. Colombia.**—*G.T.*

CLIMATE OF PARTICULAR PLACES

See also: **Climatic atlas, E. Germany,** 5.4–2; **Weather in Eskdalemuir, 120 years** (Skelton), 5.4–33; **Influence of lat. on climate of Colombia** (Londoño), 5.4–212; **Mechanism of secular climatic trends in Japan** (Yamamoto), 5.4–245.

5.4–213 551.582(748)

***Weather Vane. Anniversary issue, 1952.** Pittsburgh, Penn., The Amateur Weathermen of Pittsburgh, Nov. **1952.** 21 p. tables. Note: This anniversary issue is the 43rd publication of the Weather Vane. **DWB**—Notes on the climate of Pittsburgh—table gives numerous extreme weather records and dates, world weather records, daily high, low and average temperature for period 1875–1951 (by months) and record high and low temperature for each state in the U. S. The organization of and service rendered by the Pittsburgh Weather Bureau Offices and a list of officials in charge at Pittsburgh from 1870–date. A description of floods, flood forecasting and a list of 124 floods since 1762 are appended. Biographical data on Henry Rockwood, the official in charge since 1946, is included. *Subject Headings:* **1. Climate of Pittsburgh, Penna. 2. Climatic data 3. Floods 4. Pittsburgh, Penna. I. Amateur Weathermen of Pittsburgh, Penna.**—*M.R.*

5.4–214 551.46(262) 551.582(262)

Rouch, Jules A. P., **La Méditerranée.** [The Mediterranean.] Paris, Flammarion, **1946.** 241 p. Bibliothèque de Philosophie Scientifique. **DWB**—The book represents a summary of forty years of oceanographic study and research by the author in the Mediterranean and the secondary seas around it. A review of past oceanographic research in the area and a description of the extent and depth of the sea precede a study of the climate, including temperature, humidity, winds and barometric depressions as related to weather types. Currents of the Mediterranean, which are largely density currents, are illustrated by a study of the Straits of Gibraltar and the Bosphorus. Tides are described in the Straits of Messina and in Evripos, two of the few places where they are of significant size. The remainder of the book consists of a series of short chapters on certain areas such as the Suez Canal, the Black Sea, the Adriatic Sea, and the Dead Sea chosen for their particular interest to oceanography. *Subject Headings:* **1. Climate of Mediterranean 2. Oceanography 3. Marine meteorology 4. Mediterranean Sea.**—*M.P.K.*

5.4–215 551.582(265,51):656.6

Great Britain. Hydrographic Office. **South and east coasts of Korea, east coast of Siberia, and Sea of Okhotsk pilot. Comprising the coast from the south-western extreme of Korea to Mys Shipunskiy on the east coast of Kamchatka; and Quelpart, Tsu Shima and Sakhalin.** 4th ed., **1952.** 666 p. 77 plates. **GB-MO**—Includes the usual general meteorological introduction and a section on weather and climate p. 52–75, with climatic tables for selected stations. *Subject Headings:* **1. Pilot guides 2. Korea 3. Siberia.**—*C.E.P.B.*

5.4–216 551.582(495)

Philippson, A., **Griechenlands zwei Seiten.** [The two sides of Greece.] *Erdkunde*, 1(4/6):144–162, **1947.** 1 fig., tables. **DLC**—Greece is divided from the climatic, economic and historic points of view into a western and eastern belt. Data for temperature and precipitation (map), humidity, cloudiness, sunshine duration, etc. characterize the distinct climatic difference and a description of the vegetation cover illustrates its effect. *Subject Headings:* **1. Climate of Greece 2. Climatic regions 3. Greece.**—*A.A.*

5.4–217 551.582(713)

*§Gilbert, G. H., **Study of the local weather at Port Albert, Ontario.** *Canada. Meteorological Div., Circular* 2285, Tec. 147; *Local Forecast Study*, No. 20, May 4, **1953.** 13 p. 5 figs., 8 tables. **DWB**—Local weather characteristics of southwestern Ontario and particularly of Port Albert are described. The weather phenomena discussed are snow flurries in the lee of Lake Huron and Georgian Bay and at Port Albert; temperature difference between Lake Huron and air passing over it; thermal lows and troughs; wind direction; thunderstorms and visibility at Port Albert, etc. Data on these phenomena are tabulated for the period 1941–1943. Selected surface pressure charts are presented. *Subject Headings:* **1. Local climates 2. Local forecast studies 3. Port Albert, Ontario.**—*G.T.*

5.4–218 551.582.2(45)

*Modena. Universitá. Osservatorio Geofisico, **Osservazioni meteorologiche fatte all'Osservatorio . . . 1938–1951.** [Meteorological observations made at the Observatory . . . 1938–1951.] *Modena. Universitá. Osservatorio Geofisico, Pubblicazioni*, No. 55, [**1952.**] 89 p. mostly tables. **DWB**—Data for the Observatory (founded in 1830) which had been published in an annual volume since 1892, are assembled for the 14 years during which publication was interrupted by the war. Mean decadal (10 day) values of pressure, temperature, wind speed, vapor pressure, relative humidity, and cloud cover are given for 8, 14 and 19 h and in the mean for the day; evaporation, precipitation, prevailing wind, high and low temperatures, sunshine and miscellaneous hydrometeors and phenomena are also given for each day. Data are tabulated by months and a verbal summary of important occurrences and averages given for each year but not for the period. *Subject Headings:* **1. Climatic data 2. Modena, Italy.**—*M.R.*

5.4–219 551.582.2(481):523.7

*Oslo, Norway. Universitet. Institutt for Teoretisk Astrofysikk, **Climatological data from Norway with regard to the solar eclipse, June 30, 1954.** *Oslo. Universitet. Institutt for Teoretisk Astrofisikk, Report*, No. 2, Jan. **1953.** unpaged. mostly tables. **DWB**—Data given for five Norwegian weather stations (between 59°24′N and 60°45′N, 4°43′E and 9°10′E in the expected totality zone of the solar eclipse for the months May, June, July, Nov. and Dec. Tables give the relation between wind direction, visibility and cloudiness, height frequency of low clouds, wind force and direction, as well as temperature, humidity, precipitation and fog. *Subject Headings:* **1. Climatic data 2. Solar eclipses 3. Norway. I. Evjen, Siguard** (*comp.*).—*A.A.*

CLIMATIC CHANGES

See also: **Weather type periodicities** (Péczely), 5.4–68; **Atmos. circulation in last glacial period** (Flohn), 5.4–100; **Periglacial frost-thaw basins, N. Jersey** (Wolfe), 5.4–142.

5.4–220 551.583.3(931):529:539.16:546.2

Blau, Monte; Deevey, Edward S., Jr. and Gross, Marsha S. (*Yale Univ., New Haven, Conn.*), **Yale natural radiocarbon measurements, I. Pyramid Valley, New Zealand and its problems.** *Science*, 118(3053):1–6, July 3, **1953.** 2 figs., 3 tables, 18 refs. **DWB**—After discussion of difficulties of radiocarbon dating, a sequence of lake deposits in Pyramid Valley, Waikari, New Zealand is described and correlated with the climatic sequence in N.W. Europe and with the New Zealand pollen zones. The radiocarbon dating roughly confirms the correlation with Europe. *Subject Headings:* **1. Radiocarbon dating 2. Quaternary climates 3. New Zealand.**—*C.E.P.B.*

5.4–221 551.583.3:551.311.16

Büdel, Julius, **Die morphologischen Wirkungen des Eiszeitklimas im gletscherfreien Gebiet. (Beiträge zur Geomorphologie der Klimazonen und Vorzeitklimate, I.)** [The morphological influence of ice period climate in glacier free areas. Contribution to the knowledge of the geomorphology of the climatic zones and paleoclimatology, Part I.] *Geologische Rundschau*, Stuttgart, 34(7/8):482–519, Sept. 10, **1944.** 14 figs., 2 diagrs. (fold), 48 refs. For Part IV *see item* 2.6–127, June 1951, *MAB*. **DLC**—It is shown that the influence of the ice age climate on the present form of unglaciated regions was greater than hitherto supposed, involving changes for Tertiary fluviatile landscape amounting in places to complete transformation. Processes discussed include solifluction in valleys now generally dry, and glacial valley formation leading through overloading with sediment and seasonal flooding to broad valley floors of gravel in which the present rivers make only slight incisions. Other forms from glacial period are loess sheets and dune fields. *Subject Heading:* **1. Quaternary climates.** —*C.E.P.B.*

5.4–222 551.583.3

Büdel, Julius, **Die "periglazial"-morphologischen Wirkungen des Eiszeitklimas auf der ganzen Erde.** [The periglacial morphological effects of the Ice Age climate on the whole earth.] *Erdkunde*, 7(4):249–266, **1953.** 4 figs., 24 refs. English summary p. 249–250. **DLC**—During Würm period the climate was colder all over the earth, by 14°C in central Europe and 4°C in tropics. This was the primary phenomenon; glaciation was secondary. Surface land form zones shifted towards equator, edge of glacial zone from 77–55°N, desert 32–28°N; tropical rain forest expanded. Down to 37° every climate was replaced by a quite different one. Author describes remains of oceanic frost and tundra in W and central Europe, continental loess-tundra and loess-steppe in central and SE Europe, etc. Glacial effects only destroyed by recent effects in 69–77°N and 35–40°N. In tropics only effects were above 3000 m and in lake levels. Würm subdivisions I, II and III should be abandoned; a curve is given showing a single Würm glaciation with retreat stadia. *Subject Heading:* **1. Quaternary climates.**—*C.E.P.B.*

5.4–223 551.583.3:551.311.13:58

Charlesworth, J. K., **The history of the Irish flora and fauna.** *Advancement of Science*, London, 10:39–44, **1953.** 4 refs. **DWB**—Summary of discussion at British Association, Belfast, 1952. J. K. CHARLESWORTH described the physical conditions in Ireland during the glacial period, and their bearing on the survival of life. A. FARRINGTON described the glacial refuges, assuming that heavy precipitation rather than very low temperatures was the chief factor in glaciation of Ireland. G. F. MITCHELL discussed immigration of fauna and flora in relation to late-glacial climatic changes and J. H. HARRISON the modern distributions of Irish plants in the light of postglacial history. *Subject Headings:* **1. Quaternary climates 2. Biogeography 3. Ireland. I. Farrington, A. II. Mitchell, G. F. III. Harrison, J. H.**—*C.E.P.B.*

5.4–224 551.583.3:551.577.37

Dury, G. H., **An approach to palaeometeorology.** *Nature*, London, 172(4385):919, Nov. 14, **1953.** 5 refs., eqs. **DWB**—From the size of bends of small meandering river valleys, the maximum size of the stream forming them can be calculated in terms of rainfall intensity i in inches/hour by the relation $i = P^2/(4550\ M)$; where P is the wetted perimeter in feet and M the catchment area in square miles. Six small basins in N.W. Europe gave values of i from 0.21 to 0.33 in./hr. Falls of this intensity now occur over small areas on 2–10 days a year, but in Late Glacial times down to 10,000 years ago they appear to have been common and extensive. *Subject Headings:* **1. Precipitation intensity 2. Quaternary climates.**—*C.E.P.B.*

5.4–225 551.583.3(417)

Farrington, A., **Local Pleistocene glaciation and the level of the snow line of Groaghaun Mountain in Achill Island, Co. Mayo, Ireland.** *Journal of Glaciology*, London, 2(14):262–267, Nov. **1953.** fig., 3 refs. English and French summaries p. 262. **MH-BH**—Discussion of

evidence that glaciers on Achill Is. were purely local. The snow-line is doubtful but may have been below 1000 ft. There is evidence of later glacial advances, probably with snow line below 1750 ft. *Subject Headings:* **1. Glacial periods 2. Ireland.**—*C.E.P.B.*

MICROCLIMATOLOGY

See also: **Development in micromet. instrumentation** (Gerhardt, Gohlke), 5.4–43.

5.4–226 551.584.33

Berg, Hellmut, **Mikroklimatische Beobachtungen am Rande einer Wasserfläche.** [Microclimatic studies on the edge of a water surface.] *Annalen der Meteorologie*, 5(7/12):227–235, **1952.** 6 figs., 8 refs. Discussion p. 235. **MH-BH**—Measurements of temperature and vapor pressure were made on small Fühlinger Lake near Cologne, with a sand and gravel bank sloping 1:2, and on Rhine edge, on hot days and nights at 1–150 cm height and on water surface. Cross sections are shown and the air circulation indicated. The effect of the boundary land-water is felt to about 50 cm, but the air circulation, which is discussed in detail, only to 10 cm. In place of steady land and lake breezes there is a rhythmic breaking off of cold air bubbles. *Subject Heading:* **1. Microclimatology of lake shores.**—*C.E.P.B.*

5.4–227 551.584.41:581.5

Roach, Archibald W. (*North Texas State College, Denton*), **Phytosociology of the Nash Crater lava flows, Linn County, Oregon.** *Ecological Monographs*, 22(3):169–193, July **1952.** 13 figs., 17 tables, 24 refs. **MH-BH**—For the purpose of explaining the characteristics of the plant association a microclimatic study was undertaken. A table showing the highest maximum and lowest minimum temperatures and relative humidities within the climax forest and in the open lava at ground level based upon observations for most of the 1949 growing season is given and the relationship between temperature and effective precipitation is discussed with special reference to the phytoecology. *Subject Headings:* **1. Forest influences 2. Plant ecology.**—*I.L.D.*

5.4–228 631.6:551.584.42

*Kaganov, M. A., KHvoles, S. B. and CHudnovskiĭ, A. F., **Vliianie orosheniia na mikroklimat pochvy i prizemnogo sloia vozdukha.** [Influence of irrigation on the microclimate of the soil and on the air layer near the ground.] *Gidrotekhnika i Melioratsiia*, Moscow, No. 1:52–63, **1953.** 10 figs., 7 tables, 5 refs. **DLC**—A number of graphs shows microclimatic differences between an irrigated and an nonirrigated field (wheat and barley), observed in the Saratov district. Absolute and relative humidity at different heights, as well as air temperature are compared for selected days. Furthermore, the diurnal variation of soil temperature is discussed. *Subject Headings:* **1. Microclimate of fields 2. Irrigation 3. Saratov District European U.S.S.R.**—*A.A.*

5.4–229 551.584.4

Bator, Adelheid, **Über einige xerotherme Lokalitäten Tirols und ihre Fauna.** [Some xerothermic localities in the Tyrol and their fauna.] *Wetter und Leben*, 4(11/12):198–201 Dec. **1952.** fig., table, ref. **MH-BH**—The effect of föhn upon the distribution of certain types of fauna in the Tyrol is discussed. A list of the xerothermic species is given and their frequency is compared with that of normal species in same region. *Subject Headings:* **1. Föhn effects 2. Plant distribution 3. Arid climates 4. Tyrol, Austria.**—*I.L.D.*

5.4–230 551.584.4

Nishimura, S. (*Chugoku-Shikoku Agri. Exper. Stat.*), **Some microclimatic observations among rice plants, aimed at the consideration of sowing date of manure or forage legumes.** *Journal of Agricultural Meteorology*, Tokyo, 7(3/4):111–113, Nov. **1952.** 2 figs., 2 tables. In Japanese; English summary p. 113. **MH-BH**—In Japan, seeding of winter leguminous plants for green manure or forage use among rice plants as their after crop is practiced. Milk vetch (*Astragalus sinicus* L.) and common vetch (*Vicia sativa* L.) are generally used for this purpose. Readings of a photocell type solarimeter indicated about 10 per cent of the exterior

solar radiation is reached on the ground surface among rice plants at the end of September. Daily variation of ground surface temperature and relative humidity ranged narrower among the plants than on bare land. At the end of September, there is sufficient temperature and humidity maintained in the daytime for germination of seeds spread among rice plants. *Subject Headings:* **1. Microclimatology 2. Agricultural climatology 3. Surface temperatures.**—*From author's abstract.*

CLIMATIC CLASSIFICATIONS

See also: **Hydrology of arid and sub-arid Australia** (Hills), 5.4–204.

5.4–231 551.585.53

Meigs, Peveril, **World distribution of arid and semi-arid homoclimates.** (In: UNESCO, **Reviews of Research on Arid Zone Hydrology, 1953.** p. 203–210. table, maps (in pocket).) **DWB**—Two large scale maps show the distribution of extremely arid, arid and semi-arid regions with symbols, giving the season of precipitation and the temperature of the warmest and coldest month. In "extreme deserts" at least 12 consecutive months without rainfall have been recorded. The classification is based mainly on THORNTHWAITE's method of 1948 for computing the deficit of precipitation to potential evapotranspiration, but indices proposed by DE MARTONNE, KÖPPEN and THORNTHWAITE in 1931 also were utilized. A comparison between the different indices is made for a selected number of stations. UNESCO map by MEIGS abstracted (*see item* 4.3–264, March 1953, *MAB*). *Subject Headings:* **1. Arid zones 2. Climatic classifications 3. Thornthwaite's classification 4. Climatic charts.**—*A.A.*

5.4–232 551.585.53(55)

†Stratil-Sauer, Gustav, **Studien zum Klima der Wüste Lut und ihrer Randgebiete.** [Study of the climate of the Lut Desert and its bordering regions.] *Akademie der Wissenschaften, Vienna, Math.-Naturw. Klasse, Sitzungsberichte,* Abt. I, 161(1):19–78, **1952.** 8 graphs, tables, map, bibliog. p. 76–78. **DLC**—A number of selected weather situations are described in detail utilizing the author's own observations made in 1933. A summary of probable storm tracks is given and an attempt is made to characterize the principal feature of normal weather situations in different seasons, discussing also the daily course of temperature and humidity in the desert. *Subject Headings:* **1. Synoptic climatology 2. Arid zones 3. Lut Desert, Iran.**—*A.A.*

BIOCLIMATOLOGY

See also: **Climatic factors measure air conditioning potentials** (Hertzler, Kartorie), 5.4–131.

5.4–233 551.586:616:551.521.63

†Sargent, Frederick, II and Sargent, Virginia W., **Medical progress: season, nutrition and pellagra.** *New England Journal of Medicine,* 242:447–453, 507–514, March 23 and March 30, **1950.** 5 figs., 4 tables, 84 refs. Abstracted from reprint. **DSG**—On the basis of data on monthly intake of food and monthly incidence of pellagra collected by GOLDBERGER and data on the nutritional value of the food consumption of the population studied by GOLDBERGER the author concludes that the seasonal wave of pellagra is determined by seasonal variation in the metabolism of man (a theory postulated by EDMUND HUGHES in "Seasonal variations in man"). The external stimulus to the seasonal variation in metabolism is assumed to be the ultraviolet portion of the spectrum. *Subject Headings:* **1. Ultraviolet radiation 2. Medical meteorology 3. Pellagra.**—*I.L.D.*

5.4–234 551.586:616

Sargent, Frederick, II, (*Ill. Univ.*), **Petersen speaks for himself.** *Journal of Human Ecology,* Crystal Lake, Ill., 1(8), **1951.** 4 p. fig. **DWB**—W. F. PETERSEN's hypothesis that a close relationship exists between "variations in the meteorological environment and the onset and course of cerebral hemorrhage" is analyzed on the basis of an examination of PETERSEN's own final illness with cerebral hemorrhage and the daily weather record prevailing during

the duration of his illness. On the basis of recorded changes in weather and accompanying symptomatology observed in this single instance the author concludes that a causal relationship exists between weather and the course of the illness. *Subject Headings:* **1. Medical meteorology 2. Hemorrhages 3. Petersen, William Ferdinand.**—*I.L.D.*

5.4–235 551.586:616.3(439.1)

†*Jaki, J. (*Univ. Debrecen*), **Wurmfortsatzentzündung und Witterung.** [Appendicitis and weather.] Budapest, Carl Renyi, **1943.** 78 p. 8 figs., tables, bibliog. p. 76–78. **MH-BH**—A thorough and critical review of all the available literature on the relation between appendicitis attacks or deaths and weather or season, followed by a critique of the logical and methodical errors perpetrated by each of these authors: MILLS, PETERSEN, DE RUDDER, DÜLL, and many others, and a statistical study of 2185 cases of acute appendicitis which occurred at Debrecen during 10 years in relation to year, season and frontal passages (weather). Although other authors concluded that a decided positive seasonal or meteorological correlation was established, the evidence of these authorities is completely conflicting. The cases studied at Debrecen show no significant seasonal or meteorological correlation. The conclusion is that the apparent seasonal (spring, summer or fall maximum as the case may be) or frontal (warm or cold or warm and cold front) relations are due to other factors (such as dietary habits) which are seasonal, or to careless statistical methods. *Subject Headings:* **1. Medical meteorology 2. Appendicitis 3. Weather sensitivity 4. Debrecen, Hungary.**—*M.R.*

5.4–236 551.586:616.917

Warmbt, W., **Zur Meteorotropie des Scharlachs.** [On the meteorotropy of scarlet fever.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:93–103, **1952.** 5 figs., 8 tables, 20 refs. **DWB**—Figures of daily incidence in Dresden Jan. 1949–April 1951 are related to general weather types. The incidence is significantly greater in cyclonic zonal (westerly) type than in anticyclonic. *Subject Headings:* **1. Medical meteorology 2. Scarlet fever.**—*C.E.P.B.*

5.4–237 551.586:628.8

Haines, George J., Jr. and Hatch, Theodore (*Melon Inst., Pittsburgh, Pa.*), **Industrial heat exposures—evaluation and control.** *Heating and Ventilating*, New York, 49(11):94–104, Nov. **1952.** 12 figs., 6 tables, eqs. **DWB**—The thermodynamic principles involved in the exchange of heat between the human body and its environment are described by the heat balance equations developed at the John B. Pierce Laboratory of Hygiene (Yale University). The equations for calculating heat exchange by radiation, convection and evaporation, nomograms determining heat exchange by radiation between man and surroundings, the mean radiant temperature, heat exchange by convection between man and surrounding air and examples illustrating the applications of these equations to evaluating typical heat exposures in hot dry and warm moist conditions are given. The nature of the heat problem in a glass container plant is described and heat load contributed by radiation and convection is evaluated. The amount of improvement that could be affected by shielding radiant sources and types of radiation shielding are discussed and the evaluation of control measures to restore thermal balance by modifying the atmosphere of the working area using the thermal balance equation is illustrated. *Subject Headings:* **1. Human thermal balance 2. Air conditioning 3. Physiological climatology 4. Thermal balance of human body.**—*I.L.D.*

5.4–238 551.586:628.8

In a Texas epidemic, a new machine provides moist air to breathe. *Johns Hopkins Magazine*, 4(2):4–7, Nov. **1952.** Photographs by Ed Miley. **DLC**—Brief description with illustrations of the use of a new air-moistening apparatus developed for medical purposes by pediatrician-in-chief at Johns Hopkins, DR. FRANCIS F. SCHWENTKER. The operation is based on the mixing of a chilled and of a heated and supersaturated stream of air. Purpose of the device is to relieve breathing difficulties of patients. *Subject Headings:* **1. Air conditioning 2. Schwentker, Francis F.**—*G.T.*

5.4–239 551.586:628.8

Likely, Wadsworth, **Climates made to order.** *Science News Letter*, 60(12):186–187, Sept. 22, 1951. **DWB**—Brief popular report on the Army Engineers Fort Belvoir laboratory and other similar establishments maintained by the Armed Forces for testing military equipment in artificially created extreme climatic conditions. One of the test chambers is shown on the magazine's front page photograph. *Subject Headings:* **1. Artificial climates 2. Climatic laboratories.**—*G.T.*

5.4–240 551.586:631

†*Kramer, C., Post, J. J. and Wilten, W., **Klimaat en brouwgerstteelt in Nederland. Een bijdrage tot de oecologie van de zomergerst.** [Climate and growing of malting-barley in the Netherlands. A contribution to the ecology of spring barley.] *Netherlands. Meteorologisch Instituut, Mededeelingen en Verhandelingen, Ser. A*, No. 57, **1952.** 149 p. 27 figs., 24 tables, 38 refs. Dutch, English, French and German summaries p. 117–146. Price: F 2.25. **DWB**—A carefully prepared monograph on the influence of meteorological factors on yield and quality of barley, discussing mainly the differences between Groningen and Zeeland. Both approaches, the statistical and experimental, were used extensively. Numerous correlation coefficients were computed for precipitation, temperature and yield. The length of leaves was found to be a good indicator for the resulting crop which is closely correlated with the integral leaf-length over time. The hourly growth of leaves depends mostly on temperature. Phenological data and the effect of plant diseases are discussed. The bibliography covers German, English, Dutch and French literature on the subject. *Subject Headings:* **1. Crop yield 2. Barley ecology 3. Agricultural meteorology 4. Netherlands.**—*A.A.*

ENVIRONMENTAL INFLUENCES

See also: **Diffusion by turbulent motion near forest . . .** (Hori), 5.4–183; **Interception of precip. by forest** (Eitingen), 5.4–191.

5.4–241 551.588.6

Cameron, Hugh, **Aerial environment of the forest.** *Royal Meteorological Society. Canadian Branch, [Publications]*, 4(1):10–17, [**1953**]. 6 refs. **DWB**—General discussion of the influence of solar radiation, temperature, humidity and wind on the forest climate. Some remarks on orographic influences. *Subject Heading:* **1. Forest influences.**—*A.A.*

5.4–242 551.588.55:06

Arid zone research. *World Meteorological Organization, WMO Bulletin*, 2(3):77–78, July **1953. DWB**—Decisions regarding planned arid zone research activities taken by the Congress and Executive Committee of WMO, by its Technical Division and by the Commissions for Climatology and Aerology are summarized. Cooperation between WMO and the Consultative Committee for Arid Zone Research of UNESCO is emphasized. *Subject Headings:* **1. WMO. Resolutions 2. Arid zone research.**—*G.T.*

DYNAMIC AND SYNOPTIC CLIMATOLOGY

See also: **Multiple frontal analysis** (Gr. Brit. Naval Weather Serv.), 5.4–57; **Weather-typing of frontal rains, Oregon** (Woodbridge, Decker), 5.4–70.

5.4–243 551.589

Gordon, A. H., **Dynamic climatology.** *World Meteorological Organization, WMO Bulletin*, 2(4):121–124, Oct. **1953. DWB**—Dynamic climatology is defined by the author (who was appointed chairman of the Working Group on Dynamic Climatology at the C Cl meeting in Washington, March 1953). Statistical and synoptic aspects are discussed and the purpose and methods briefly formulated. This purpose is said to be "the discovery of a means whereby the application of climatological data to forecasting can produce positive results." Examples of past and proposed investigations along these lines are cited. *Subject Heading:* **1. Dynamic climatology.**—*M.R.*

5.4–244 551.589.1:551.515.1:551.515.8

Dammann, Walter, **Klimatologie der Tiefdruckgebiete und Fronten.** [Climatology of depressions and fronts.] *Annalen der Meteorologie*, 5(7/12):395–402, **1952.** 7 figs., 6 refs. **MH-BH**—Synoptic climatology can be based on distribution of areas of high and low pressure, boundaries of main air masses and frequency of depressions. Climatic provinces are related to frequency of 500 mb troughs. The picture is completed by frequency of fronts and occlusions, which cause changes of weather and are influenced by relief and land-sea distribution. N. Hemisphere charts of all these are given. *Subject Heading:* **1. Synoptic climatology.**—*C.E.P.B.*

MISCELLANEOUS APPLICATIONS

SOLAR INFLUENCES

5.4–245 551.590.21:551.582(52)

Yamamoto, T. (*Yamaguchi Univ.*), **Some considerations about the mechanism of secular trends of the climate of Japan.** *Meteorological Society of Japan, Journal*, 31(1):18–21, Jan **1953.** fig., 10 refs. In Japanese; English summary p. 18. **DWB**—Eleven-year running means of sunspots are compared with pressure, temperature and precipitation trends for Japanese stations, available since about 1890. A mechanism of atmospheric effects is proposed on the basis of some similarity between the curves, which seems to break down after 1940. *Subject Headings:* **1. Solar influences 2. Sunspots 3. Climatic trends 4. Climate of Japan 5. Japan.**—*A.A.*

5.4–246 551.590.24:523.78:551.521.7

*Portugal. Serviço Meteorológico Nacional, **Meteorological and geophysical observations in Portugal on the occasion of the solar eclipse of Feb. 25, 1952.** *Portugal. Serviço Meteorológico Nacional RT* 121, MEM 20, April 15, **1953.** 8 p. 5 figs., tables. Also in its *Memórias* v. 11, **1953. DWB**—Observations were taken at San Miguel, Azores; Bolama, Portuguese Guiana; Saõ Tomé, (island) Port. Equatorial Africa; Luanda, Angola and Macao. At Bolama, Saõ Tomé and Luanda the minimum air temperature occurred at time of occultation. Total radio noise observations were made at Macao at 19 Mc/s. Ionospheric observations were also made with pulses at 6 Mc/s and data for total radio noise and vertical height of F-layer shown graphically for Feb. 1–March 7, 1952. A double oscillation in both parameters was noted during the afternoon of the day of eclipse, as well as a variation in the intensity of receipt of Rome RAT station at 15 Mc/s. *Subject Headings:* **1. Solar eclipses 2. Solar radio noises 3. F layer height 4. Macao 5. Portuguese Colonies.**—*M.R.*

VISIBILITY

See also: **Influence of field of view on atmos. transmission measurements** (Stewart, Curcio), 5.4–117.

5.4–247 551.591.1:535.

†*Hamburger, Franz Anton, **Das Sehen in der Dämmerung. Physiologie und Klinik** [Twilight vision, physiological and clinical aspects.] Vienna, Springer-Verlag, **1949.** 185 p. 42 figs., 24 tables, bibliog. p. 174–183. **DLC**—An unusually condensed and up to date text on a borderline field which is becoming more and more important in observational and operational phases of aeronautical meteorology. The main chapters are devoted to: I. Basic principles; II. Methods of determination of contrast threshold, adaptation, etc.; III. Adaptation; IV. Differences between individuals, and V. to IX the various physiological and electrochemical aspects of the eye and nervous system which affect adaptation to dark. An excellent bibliography is appended. Effect of color (spectral sensitivity) in day and night vision, age of observer, individual idiosyncrasies, readaptation, blending, etc., are thoroughly treated with numerous curves and tables of results with various instruments and various observers. *Subject Headings:* **1. Twilight visibility 2. Physiological factors in visibility 3. Contrast threshold.**—*M.R.*

5.4–248 535.7:551.591

†Studnitz, Gotthilft von, **Physiologie des Sehens. Retinale Primärprozesse.** [Physiology of sight. The primary retinal process.] 2nd newly rev. and enlarged ed. Leipzig, Geest & Portig, **1952.** 493 p. 72 figs., 22 tables, bibliog. p. 446–470. *Probleme des Biologie*, Leipzig, v. 3. **DLC**—Although this book deals mainly with the physiology of the eye of man and other vertebrates, there are several chapters on contrast threshold and adaptation to lights and colors of various intensities. The literature on each phase of this subject is reviewed in an unusually thorough manner. Curves showing visibility in various colors of light, as well as intensities are presented. References to literature published in 1950 and 1951 are numerous, indicating that this second edition has been truly revised and enlarged since the first edition appeared in 1939. *Subject Headings:* **1. Physiological factors in visibility 2. Contrast threshold.**—*M.R.*

OPTICAL PHENOMENA

5.4–249 551.593.63

Richardson, W. E., **Four simultaneous concentric halos.** *Meteorological Magazine*, London, 82(975):277–279, Sept. **1953.** fig., 4 refs. **DWB**—April 10, 1953, Alston, Cumberland, haloes of 9–11°, 18–20°, 22° and 46°, also at different times parhelia, parhelic circle and upper arc of contact to 22° halo. *Subject Heading:* **1. Halo observations.**—*C.E.P.B.*

5.4–250 551.593.63:778.3

Roth, Gunter D., **Photography of halo-phenomena.** *Weather*, 8(8):249, Aug. **1953.** photo. **MH-BH**—Methods described—wide angle lens or reflection from silvered ball, yellow filter, infrared film with infrared filter. *Subject Heading:* **1. Halo photography.**—*C.E.P.B.*

5.4–251 551.593.63

Scutt, R., **Rare mock sun seen from Gresford, Denbighshire.** *Meteorological Magazine*, London, 82(971):155–156, May **1953.** fig. **MH-BH**—A comet-shaped, rainbow-colored mock sun at 15 h 10 m Dec. 12, 1952, is sketched. Nose was 35° to right of sun. *Subject Heading:* **1. Parhelia.**—*C.E.P.B.*

5.4–252 551.593.63

Solar halo, Formosa Strait. *Marine Observer*, 23(160):79–80, April **1953.** 2 figs. **DWB**—April 25, 1952, 22° and 46° haloes, sun pillar, mock suns and upper arc of contact to 22° halo. Near sunset the sun pillar became Y shaped. This is attributed to coincidence of 22° haloes round two mock suns. *Subject Heading:* **1. Halo observations.**—*C.E.P.B.*

ELECTRICAL PHENOMENA

See also: **Statistical results of phenomena associated with ionospheric storms** (Chappell, others), 5.4–88; **Slow electron motion in air, applied to ionosphere** (Cropton, others), 5.4–90; **Thunderstorm research program** (Workman, Reynolds), 5.4–113; **Night sky spectrum** (Pearse), 5.4–127.

5.4–253 551.594.18:550.389

Chapman, Sydney, **The equatorial electrojet as detected from the abnormal electric current distribution above Huancayo, Peru, and elsewhere.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 4:368–390, **1951.** 13 refs. English, German and French summaries p. 368–369. **DWB**—The abnormally large solar day range of the quiet day N component of the horizontal magnetic force at Huancayo, Peru (geomagnetic latitude −0.6) compared with Madras, Java etc. points to the daily rise and decline of an intense narrow eastward electric current there, superposed on the normal daily variation. It is also traced at Bombay and Manila. Author terms this the *electrojet* and calculates some provisional values for its intensity and width for alternative heights of 100 and 250 km. *Subject Headings:* **1. Electrojet 2. Ring currents 3. Terrestrial magnetism 4. Huancayo, Peru.**—*C.E.P.B.*

5.4–254 551.594.2

Reynolds, S. E. and Neill, Howard, **Thunderstorm electricity.** New Mexico Institute of Mining and Technology. Research and Development Div., Project DA 3-99-07-022, Project Sc 24-172B, Final Report (Report no. 8), May 6, 1951—May 7, 1953. 40 p. 11 figs., 4 plates, 3 tables. Appendix A: Harris, Clyde W. and Chabrek, Alex F., **A simple survey camera.** *Review of Scientific Instruments*, 22(11):850, Nov. 1951. [Reprint.] 2 figs. **DWB**—The purpose of the research reported in this paper was to determine the mechanics of electrical charge production and separation within thunderstorms. The charge centers involved in lightning discharges were located by means of recording galvanometers equipped with a system of three mirrors. Gradient charges were measured with these instruments at seven points on the ground. Instrumentation, calibration, observation and analysis techniques are discussed in detail and illustrated. Cloud and precipitation conditions observed by radar and other techniques, and environmental temperature are also dealt with. A comparison is made with findings of MALAN and SCHONLAND in South Africa. The report includes several observations on precipitation formation. A revolving cloud camera is described and illustrated in Appendix A. Two papers published earlier in *AMS Bulletin* (*see items* 4.9–33, Sept. 1953 and 5.2–192, Feb. 1954, *MAB*) are added as Appendix B and C. *Subject Headings:* **1. Thunderstorm electricity 2. Precipitation formation 3. Cloud photography. I. New Mexico Institute of Mining and Technology. Research and Development Div. II. Project DA 3-99-07-022 III. Project Sc 24-172B.**—*G.T.*

5.4–255 551.594.21

Loeb, Leonard B., **Contributions to the Thunderstorm Electrification Conference from the University of California at Berkeley.** (In: **Thunderstorm electricity.** Chicago University, Dept. of Meteorology, Oct. **1950.** p. 111–127. 11 figs., table.) **DWB**—Studies involving the spray electrification of liquids using the Millikan oil drop technique and ionic mobility spectra failed to give decisive results on the generation and reparation of electric charges under moderately turbulent conditions. Investigations on corona discharge are described and the results indicate that the charge generated is inadequate to account for observed thunderstorm electrification. An abstract of a study by W. B. KUNKEL on "The static electrification of dust particles on dispersion into a cloud" is included. This work shows that electrification of both signs in equal amounts occurs when homogeneous dusts are separated through dispersion. *Subject Headings:* **1. Thunderstorm electricity. I. Kunkel, W. B.**—*I.L.D.*

5.4–256 551.594.21

†Schonland, B. F. J., **The work of Benjamin Franklin on thunderstorms and the development of the lightning rod.** *Franklin Institute, Journal*, 253(5):375–392, May **1952.** 4 figs., 47 refs. **DWB**—A discussion of FRANKLIN's thundercloud theories and experiments, with numerous citations from his letters, notes and from other sources. His thoughts from 1747 when he first considered the origin of thunderstorm electricity to his "Philadelphia Experiment" on May 10, 1752, and his growing conviction that an electric spark produced in the laboratory was the same as a lightning stroke except in magnitude, and his development of the lightning rod and ideas on its effectiveness in neutralizing charge in cloud, are systematically presented. *Subject Headings:* **1. Thunderstorm electricity 2. Lightning rods 3. Franklin's experiment. I. Franklin, Benjamin.**—*M.R.*

5.4–257 551.594.21

Tanaka, Michio, **Lightning hazards in Japan.** *Electrical Engineering*, N. Y., 70(2):1065–1067, Dec. **1951.** charts, graphs, refs. **DLC**—Reference is made to the book "Study of lightning" published in 1950 which contains a report on research done by a lightning hazard subcommittee of the Japanese Society for the Advancement of Science. Data contained in an annual report for 1950 of the Kansai District Subcommittee of the Power System Lightning Hazard Prevention Committee are presented, including charts of frequencies of thunderstorms and days with cumulonimbus in central Japan, voltage expectancy curves and tables of damage. *Subject Headings:* **1. Thunderstorm frequencies 2. Lightning damage 3. Kansai District, Japan.**—*G.T.*

5.4–258 551.594.22

Norinder, Harald, **Variations of the electric field in the vicinity of lightning discharges.** *Arkiv för Geofysik*, Stockholm, 1(20):543–570, **1953.** 51 figs., 2 tables, refs. p. 570, 3 eqs. **DWB**—Variations of electric field measured at two stations by means of recording cathode-ray oscillographs connected to open antenna circuits and aperiodic amplifiers. Eight hundred oscillograms analyzed. Predischarges of lightning strokes have a wave-length of about 11 km. Statistical analysis made of crest current values of vertical lightning discharges, quasi-frequencies field variations, duration of predischarges, main and partial discharges and wave forms. Methods of measurement and computations explained in detail. Typical examples shown graphically; classification of discharge types attempted. *Subject Headings:* **1. Lightning discharges 2. Atmospheric electricity.**—*A.A.*

5.4–259 551.594.22:537.52

Raether, Heinz, **Zum Aufbau von Gasentladungen.** [On the building up of gas discharges.] *Zeitschrift für angewandte Physik*, 5(6):211–217, **1953.** 3 figs., table, 13 refs., 8 eqs. **DLC**—At low pressures an electric discharge builds up as ionization changes. At large pressures it takes the form of a multiple channel discharge. A series of discharges eventually becomes so numerous that they fill the discharge zone. Each successive discharge increases ionization and eventually the critical strength is reached and channel formation occurs. *Subject Heading:* **1. Electrical discharges.**—*C.E.P.B.*

5.4–260 551.594.221

Norinder, Harald and Karsten, Olof (*Inst. for High-Tension Research, Uppsala, Sweden*), **Investigation of resistance and power in experimental lightning discharges.** *Franklin Institute, Journal*, 252(3):225–233, March **1952.** 8 figs., 10 refs. **DWB**—Cathode ray oscillographs combined with a high-speed rotating film were used for measurement of resistance and power in artificial lightning discharges up to lengths of 51 cm produced in circuits with currents up to 102 kA, total charges of 1.2 coulombs and a total quantity of energy of 30 kw. Ionization conditions within the spark are calculated and discussed. Results are applied to natural lightning discharges. Authors refer to their paper published under a similar title in *Arkiv för Matematik, Astronomi och Fysik*, v. 36A, No. 16, 1949, which contains a more detailed account of the experiments and from which the figures presented in this article have been reproduced. *Subject Headings:* **1. Lightning strokes 2. Artificial lightning 3. Sweden.**—*G.T.*

5.4–261 551.594.6

Henissart, Martha, **Low-frequency noise in the range 0.5–20 cycles per sec.** *Nature*, London, 172(4380):682–683, Oct. 10, **1953.** 4 figs., 3 refs. **DWB**—Describes measurements in Massachusetts and New Mexico; records of noise storm and quiet periods are shown. Storms were frequent and are often correlated with ionospheric storminess, K-index, and solar radio noise (including a peak at lags of 29 and 37 days). A regular diurnal variation was found. *Subject Heading:* **1. Radio noise bursts.**—*C.E.P.B.*

PART II. ANNOTATED BIBLIOGRAPHY ON THE TROPOPAUSE

By: *Malcolm Rigby* and *Mollie P. Kramer*

INTRODUCTORY NOTE

With increasing demands for detailed study and analysis of the upper air stemming from the requirements of high level flight and advancing methods of weather forecasting, subjects such as the tropopause have become of prime concern to meteorologists. Interest extends beyond the physical characteristics of the tropopause and its observed variations with season, latitude and synoptic pattern to even more complicated questions of its relationships to the jet stream (wind), pressure, temperature, ozone content, humidity and many other factors, and to its usefulness in their forecasting.

It is hoped that the references below will provide a fairly exhaustive coverage of the literature on the tropopause from 1900 to the present. A few synoptic-aerological studies which contain cross sections showing tropopause height and temperature are included, but the majority of such papers has been withheld for publication in a subsequent bibliography on Synoptic Aerology.

Mairan (see item 4J–4 in October 1953 MAB) in 1754 proposed a model atmosphere consisting of 3 layers: the Lower Layer extending from the surface to 10 or 12 km. where storms, hydrometeors, etc. occurred; the Middle Region from 10 or 12 km. to 80 km. where activity which control the barometric pressure takes place, and the Auroral Zone from 80 to 1000 or more km. Such ideas were considered preposterous by the best scientists until the proof of the Tropopause in 1902 and the Ionosphere a decade or two later forced the theory to become adjusted to the observational evidence.

High level manned balloon soundings as early as 1860 by Glaisher in England showed vertical temperature gradients which implied the existence of a tropopause and stratosphere above, but even such soundings were considered erroneous because they were contradictory to theoretically extrapolated temperature gradients and current theory up to 1900. Not until the almost simultaneous announcements by Richard Assman (*see* 5D–2 below) and Leon Teisserenc de Bort (*see* 5D–3 below) in 1902 was the discovery of the tropopause officially recognized. The distinction between the tropical and polar tropopauses and the resulting concept of the multiple or laminated tropopause were not established until as late as the 1930's.

Future studies will be greatly facilitated by the growing accumulations of tropopause data on punched cards in the archives of the weather services of Great Britain, Australia, the United States and other countries. These services were slow to begin such tabulations because of the obvious difficulty in objective identification of even a single tropopause, and in handling statistically multiple or indefinite tropopauses.

The asterisk (*) has been used to denote a good source of data, the dagger (†), a good source of references and the symbol (§) a source of synoptic material. The library symbol NJP identifies those references available at the Princeton University Library, Princeton, N. J.

SUBJECT OUTLINE

General Studies

History and discovery, 5D–1 to –4, –15, –16, –18, –215, –231
Progress and research, 5D–16, –63
Textbooks and manuals, 5D–67, –109, –124, –197, –216, –231
Photographs, 5D–90
Charts, models and cross sections, 5D–43, –54, –55, –58, –61, –67, –68, –70, –71, –79, –84, –86, –91, –92, –95, –103, –114, –122, –124, –127, –132, –134, –167, –170, –172, –175, –197, –201 to –203, –207, –214, –218, –220, –223, –226, –227

Observational Methods

Radiosondes (almost all observations after 5D–100 were obtained with radiosondes)
Manned balloons and dirigibles, 5D–33, –60, –90
Radio reflection, 5D–141
Sounding balloons, 5D–3, –4, –6 to –9, –12, –17, –18, –24, –26, –27, –35, –39, –53, –57, –65, –69, –89
Pilot balloons, 5D–28, –33

Tropopause Theory

Tropopause formation, 5D–46, –98, –109, –114, –142, –192, –231
Radiation balance, 5D–10, –14, –15, –25, –32, –47, –63, –117, –130, –158, –192, –225, –229
Polar tropopause, 5D–25, –84, –92, –121, –125, –131, –152, –167, –179, –185, –192, –197, –226
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BIBLIOGRAPHY ON THE TROPOPAUSE

1900

5D–1 551.524.7

Von Bezold, Wilhelm, **Theoretische Schlussbetrachtungen.** [Theoretical conclusions.] (In: Assmann, Richard and Berson, Arthur, eds., **Wissenschaftliche Luftfahrten.** Braunschweig, F. Vieweg, **1899–1900.** v. 3. p. 283–313. 17 figs., tables, refs.) **DLC**—The conclusion reached after studying soundings up to 10 km and applying radiation theory was that the lapse rates at high altitudes must be nearly dry adiabatic rather than nearly isothermal as GLAISHER's famous manned balloon ascent to 8.5 km indicated. It was recognized that an adiabatic lapse rate would lead to a temperature of absolute zero at 30 km, and that there must be some tapering off of this lapse rate, but the fact that in such rare air the concept of temperature is not comparable with that at the surface of the earth, led the leading aerologists to question the accuracy of GLAISHER's data. *Subject Headings:* **1. Tropopause discovery 2. Vertical temperature gradient.**—*M.R.*

1902

5D–2 551.510.52/3

*Assmann, Richard, **Über die Existenz eines wärmeren Luftstromes in der Höhe von 10 bis 15 km.** [On the existence of warm air currents at the height of 10 to 15 kilometers.] *Akademie der Wissenschaften zu Berlin, Sitzungsberichte,* No. 23/24:495–504, May 1, **1902.** table, refs. **DLC**—The results of 6 ascents with rubber sounding balloons in Berlin in 1901 (April to Nov.) showed in every case a marked isothermal layer or inversion which could not be attributed to instrumental error or radiation conditions (as 3 of the ascents occurred during darkness). Each of the ascents is discussed in detail, the temperature and lapse rate data for every 500 m (to 17.5 km) given, and the conclusion drawn that the inversion is due to warm air from tropical oceans descending in the temperate latitudes, and that around 16 km the temperature may again fall off (as evidence from July 31 sounding indicated). On July 31, BERSON and SÜRING reached 11 km in a manned balloon but were too unconscious to read their instruments. *Subject Headings:* **1. Tropopause discovery 2. Tropopause theory 3. Vertical temperature gradient 4. Berlin, Germany.**—*M.R.*

5D–3 551.524.4

Teisserenc de Bort, Léon Philippe, **Sur la décroissance de température dans les hautes régions d'après 258 balloons ayant atteint ou depassé 11 km. Ueber die Abnahme der Temperatur in den hohen Schichten, nach 258 Ballons, die 11 km erreicht oder überschritten haben.** [The decrease in temperature in the upper layers as shown by 258 balloons which reached or exceeded 11 km.] *International Aerological Commission, 3rd, Berlin, 1902, Protokoll,* p. 69–73, publ. **1903.** table, diagr. **DLC**—The author states that he had reported in Oct. 1901 at the meeting of the German Luftschiffahrt-Verein, the fact that the paper balloon soundings at Trappes had shown that the temperature ceased to fall at about 11 km, and that the height of the layer depends on the weather conditions prevailing at the place. The discovery was said to be in complete disagreement with current theory. Two examples were given in 1899 before the Société de Physique, Paris. Tabular results and a graphical presentation showing the two extreme types of tropopause (in a HIGH and LOW) in March 1899 are included. *Subject Headings:* **1. Tropopause discovery 2. Vertical temperature gradient 3. Trappes, France.**—*M.R.*

5D–4 551.524.7

*Teisserenc de Bort, L. P., **Variations de la température de l'air libre dans la zone comprise entre 8 km et 13 km d'altitude.** [Temperature variations of the free air between 8 and 13 km altitude.] *Académie des Sciences, Paris, Comptes Rendus,* 134(17):987–989, April 28, **1902.** table. **DWB**—The first public announcement, preceding by only 3 days that of ASSMANN (*see* 5D–2 above), of the discovery of and the characteristics of the tropopause and stratosphere up to 14 km. This was

probably the most fundamental discovery in meteorology of that decade, and it ushered in a new era of aerological investigations and theoretical works on the upper atmosphere. The report is based on 236 soundings with paper balloons at Trappes France, which exceeded 11 km, 74 of which went higher than 14 km. The average height of tropopause was placed at 11 km, with a range from 8 to 13 km. It was noted that the tropopause was higher over anticyclones and lower over deep cyclones. Data are tabulated according to 9 synoptic types or locations. *Subject Headings:* **1. Tropopause discovery 2. Tropopause height 3. Trappes, France.**—*M.R.*

1904

5D–5 551.524.7

Teisserenc de Bort, Léon Philippe, **Sur les caractères de la température dans l'atmosphère libre au dessus de 10 kilomètres.** [The characteristics of the temperature in the free atmosphere above 10 km.] *International Aerological Comission, 4th, Leningrad, 1904, Procés-Verbaux des Séances et Mémoires*, p. 110–121, publ. **1905.** figs. (1 fold.), table. **DLC**—Mean monthly temperature curves from 0 to 14 km for Trappes, Dec. and July (1899–1903), show marked seasonal variation in temperature and lapse rate (above 10 km). At 14 km the temperature is equal at both seasons. The author also states that the lowest temperatures at the tropopause are above high pressure areas in advance of depressions. Isotherms for consecutive days (1–10 March 1903) show marked frontal passages to great height on 4 occasions, and the author remarks that changes from day to day at great heights may be greater than at the surface. The cooling effect of a high is shown to extend to greater heights than the effect of a low. *Subject Headings:* **1. Vertical temperature gradient 2. Tropopause temperature 3. Trappes, France.**—*M.R.*

5D–6 551.524.7

*Teisserenc de Bort, L. P., **Sur la décroissance de température avec la hauteur dans la région de Paris d'après 5 années d'observations.** [On the decrease of temperature with height in the regions of Paris based on 5 years of observations.] *Académie des Sciences, Paris, Comptes Rendus* 138(1):42–45, Jan. **1904.** table. **DLC**—Tabulated balloon sonde data show monthly mean temperatures at each 500 m interval from the surface to 14 km for each season and the differences between the highest and lowest monthly means for each level. *Subject Headings:* **1. Tropopause height data 2. Tropopause temperature data 3. Vertical temperature distribution 4. Paris, France.**—*M.P.K.*

1905

5D–7 551.510.52/3

Hergesell, Hugo, **Neue Beobachtungen über die meteorologischen Verhältnisse der hohen wärmeren Luftschicht.** [New observations on the meteorological conditions of the upper warm air layer.] *Beiträge zur Physik der freien Atmosphäre*, Strassburg, 1(3):143–146, **1905.** graph, table. **DLC**—Results of a carefully prepared balloon ascent at Strassburg, with the balloon followed by a theodolite so that the wind direction and speed of the warm layer could be determined. The inversion occurred at 11.3 km with wind from ESE changing to ENE and NE and finally NW from 13.8 to 14.7 km (top). Conclusion is that the "upper inversion" constitutes a sharp discontinuity in temperature, humidity and wind direction, and that vertical motion is wanting above the tropopause. Also the upper warm layer is caused by a westerly current. *Subject Headings:* **1. Tropopause-wind relationships 2. Upper air winds 3. Strassburg, France.**—*M.R.*

1906

5D–8 551.524.7

Clayton, Henry Helm, **A discussion of the observations obtained by the Blue Hill Observatory with balloons-sondes at St. Louis.** *Beiträge zur Physik der freien Atmosphäre*, Strassburg, 2(2):35–50, **1906.** 18 tables. **DLC**—Analyses of data from 37 sounding balloon ascents reaching 11 km (13 reached 15 km) at St. Louis in 1904–5 show that steep temperature gradients exist just below the cumulus level and the cirrus level, and inversions at 13–15 km—higher than found in Europe by Assmann and Teisserenc de Bort. The temperature gradients are compared with those from 53 soundings at Paris and 75 at Berlin, as are also the mean temperatures at different heights and seasons. (Moscow ascents did not go above 10 km.) Relation of temperature to quadrants of cyclones or anticyclones also analyzed, with fact revealed that coldest air is in rear of cyclone center and warmest in rear of anticyclone (or front of cyclone). Author suspects a cold air pool over cyclones. *Subject Headings:* **1. Tropopause height 2. Vertical temperature gradient 3. Cyclone-anticyclone structure 4. St. Louis, Mo.**—*M.R.*

1907

5D–9 551.510.52/3:551.557.3

Bassus, K. von, **Über die Windverhältnisse in der oberen Inversion.** [Wind conditions at the upper inversion.] *Beiträge zur Physik der freien Atmosphäre*, Strassburg, 2(3):92–95, **1906/1907.** graphs, table. **DLC**—Nine temperature soundings for European stations to 15 or 20 km are compared graphically level for level with wind direction and speed as obtained by following the sounding balloon with a theodolite (only soundings at clear days could be used), and the conclusion reached that there is usually a more or less sudden and marked drop in wind speed at the "upper inversion." The wind dropped off in all 9 cases, with a percentage ranging from 80% in the greatest to 24% in the least case. In 7 cases there was a significant change in wind direction, and the resulting direction was in most cases northerly though irregular. *Subject Headings:* **Tropopause wind relationships 2. Europe.**—*M.R.*

5D–10 551.511

Knoche, Walter, **Zum Wärmegehalt der Atmosphäre.** [Heat content of the atmosphere.] *Beiträge zur Physik der Freien Atmosphäre*, Strassburg, 2(4):177–182, **1907.** 4 figs., 4 tables. **DLC**—In an article on the heat balance of the earth, the author presents a model of the atmosphere from 0 to 50 km in tabular and graphic form, including theoretical-empirical curves of vertical distribution of heat content Q in kg.cal./cu m., equivalent temperature, and temperature. The heat content curve reaches a minimum at ca. 10 km and rises to 30 km then becoming constant up to 50 km. However, the temperature and equivalent temperature curves go on falling to a value of −19.4°C at 50 km—evidently completely ignoring the tropopause and data on the stratosphere accumulated for 5 years or more. Pressure and vapor pressure are also given in table. *Subject Headings:* **1. Atmospheric models 2. Heat balance of atmosphere 3. Tropopause theory.**—*M.R.*

5D–11 551.506.7

*Teisserenc de Bort, Léon P., **Sur la distribution de la température dans l'atmosphère sous le cercle polaire Nord et à Trappes.** [On the distribution of temperature in the atmosphere beneath the Arctic circle and at Trappes.] *Académie des Sciences, Paris, Comptes Rendus*, 145:149–152, July **1907.** table, refs. **DLC**—A small amount of data is tabulated to compare vertical temperature distribution over Moscow and Trappes (1901) and over Kiruna and Trappes (1907). Conclusive evidence of Arctic tropopause based on 8 soundings. Surface temperatures, minimum temperatures and temperatures of highest points reached (varying between 8 and 17 km) given. (Also in *Meteorologische Zeitschrift*, 24:498–99, 1907.) *Subject Headings:* **1. Tropopause height data 2. Tropopause temperature data 3. Polar tropopause 4. Moscow, U.S.S.R. 5. Trappes, France 6. Kiruna, Sweden.**—*M.P.K.*

5D–12 551.506.7:551.510.52/3

*Hooreman, F., **Lancers internationaux de ballons-sondes. Ascensions du 7 mars . . . 3 janvier 1908.** [International launchings of sounding balloons. Ascents of March 7–Jan. 3, 1908.] *Ciel et Terre*, v. 28:65–67; 125–127; 388–391; 411–414; 500–502; 573–575, **1907–1908.** tables. **DWB**—Tabulated data show height and temperature recorded on ascent and descent through isothermal region, at the tropopause, and in lower layers above Uccle. *Subject Headings:* **1. Sounding balloon data 2. Tropopause height data 3. Tropopause temperature data 4. Uccle, Belgium.**—*M.P.K.*

1908

5D–13 551.510.52/3:551.571

Kleinschmidt, Ernst, Sr., **Über die Feuchtigkeitsverhältnisse der oberen Inversion.** [Humidity conditions at the upper inversion.] *Beiträge zur Physik der Freien Atmosphäre*, Strassburg, 2(5):205–207, **1908.** table. **DLC**—In spite of the well known lag in the humidity element of sounding balloon meteorographs (hair hygrometer) the humidity during soundings at Strassburg on March 1, 1906, April 11, July 26 and Oct. 3, 1907, dropped so markedly at the tropopause that there was no doubt that a drop in absolute humidity which would imply lack of mixing between the stratospheric and tropospheric air, occurs at the tropopause. The drop was from ca. 65% to 35% or lower. Examination of many other flights since 1904 showed that, allowing for low temperature effect, no case of a rise in humidity at the tropopause could be found. *Subject Headings:* **1. Tropopause humidity 2. Strassburg, France.**—*M.R.*

1909

5D–14 551.510.53:551.521

†Gold, E., **The isothermal layer of the atmosphere and atmospheric radiation.** *Royal Society of London, Proceedings, Ser. A*, 82(551):43–70, Feb. 16, **1909.** tables, eqs., foot-notes. **DLC**—

Evidence of the "isothermal layer" or as the author prefers to call it, the "the isothermal region," obtained by soundings at Trappes, Berlin, Milan, England, America, Lapland, Brussels, Strassburg, etc. is cited. The radiation balance of the atmosphere is invoked to explain the stratosphere and the variation in the height thereof. Water vapor plays an important part in the troposphere but since it does not extend into the higher regions the radiation given off by the atmosphere in those regions must exceed that absorbed. Convection is important up to from 3/4 (5530 m.) to 1/2 (10,500 m) of the total pressure of the atmosphere. The major part of the article is devoted to theoretical and experimental considerations of gaseous components of atmosphere and radiation balance. *Subject Headings:* **1. Tropopause theory 2. Radiation balance 3. Chemical composition of the atmosphere.**—*M.R.*

5D–15 551.524.7:551.510.52/3

Humphreys, W. J., **Vertical temperature-gradients of the atmosphere, especially in the region of the upper inversion.** *Astrophysical Journal*, 29(1):14–32, Jan. 1909. fig., table, refs. **DLC**—A lucid summary of discovery of stratosphere, characteristics of same as known at time, and theory of formation of stratosphere. Several theories (Assmann, Nimführ, Finji, Trabert, Very and Gold) are reviewed and objections to all but the last are raised. The general theory proposed is that convection due to local surface heating determines the height, and radiation balance enters into the temperature of the tropopause. The abrupt change at some places is said to be due to cirrus, the higher summer tropopause to greater moisture and therefore greater effective radiating surface at higher elevations. The lower warmer tropopause in cyclonic regions is attributed to heating as a result of precipitation. Ozone is claimed to be the cause of selective absorption of long wave radiation in the atmosphere and of higher temperature there. The formula for computing the temperature of the tropopause is given as $T_1 = 0.84\ T_2$, and the height as $h_1 = h_o \int_{T_0}^{T_1} \frac{dh}{dT'}$ in which h_o = initial height; h_1 = height of tropopause; $\frac{dh}{dT}$ = reciprocal of temperature gradient; t_o = abs. temperature of elev. h_o; t_1 of tropopause, h_1; and T_2 = abs. temperature of effective radiating surface or of a dense layer of H_2O vapor. *Subject Headings:* **1. Tropopause theory 2. Vertical temperature distribution.**—*M.R.*

5D–16 551.510.52/3

†Schmauss, A., **Die obere Inversion.** [The upper inversion.] *Meteorologische Zeitschrift* 26(6):241–258, **1909.** 2 figs., refs., eqs. **DWB**—A thorough review of the progress (based on the 1899–1908 literature) in investigation and interpretation of the stratosphere. The actual existence of the "upper warm current" as the stratosphere is called, is first questioned and all of the objections based on instrumental or radiation errors or local peculiarities eliminated. The dependence on weather type, season and locality is next treated. Three types of tropopause are recognized and used in the analysis. Finally, the current explanations of the tropopause are discussed critically. *Subject Headings:* **1. Tropopause discovery 2. Tropopause theory 3. Tropopause types.**—*M.R.*

5D–17 551.587(26

*Teisserenc de Bort, Léon P. and Rotch, Lawrence, **Étude de l'atmosphère marine par sondages aériens Atlantique moyen et région intertropicale.** [Study of the atmosphere at sea by aerological soundings over the middle and intertropical regions of the Atlantic.] *Trappes, France. Observatoire de Météorologie Dynamique, Travaux Scientifiques*, **1909.** 241 p. 36 figs., extensive tables **DLC**—Important compilation and analysis of kite and captive balloon data on upper air temperature, pressure, wind and humidity over the tropical and South tropical Atlantic as recorded on the research vessel "Otaria," 1905–07. (*Same item as* 4E–1, May 1953, *MAB.*) *Subject Headings:* **1. Upper air data 2. Tropopause data 3. East Atlantic.**

5D–18 551.524.

*Wagner, Arthur, **Die Temperaturverhältnisse in der freien Atmosphäre.** [Temperature conditions in the free atmosphere.] *Beiträge zur Physik der freien Atmosphäre*, 3(2/3):57–168 **1909.** 8 figs., 54 tables, refs. **DWB**—Extensive discussion and tabulation of annual, seasonal and monthly variations of mean temperatures at 1 km intervals up to 16 km using data from 380 international unmanned balloon ascents, July 1902–June 1907 in Europe. Free air temperature variations are compared with observations from mountain stations and with annual variations of pressure and density. A section (p. 108–117) on the isothermal zone includes a review of explanatory theories to that date and an illustrated discussion of the correlation between tropopause height and temperature and the annual variation of both factors. A further subdivision of the study contains discussion and tabulation of temperature conditions in the free atmosphere over various parts of

Europe and includes data (p. 148) on seasonal variation of tropopause height over the same regions. Pages 150–162 deal with the influence on free air temperature, and tropopause height and temperature (p. 161–2) of a cyclonic or anticyclonic pressure pattern. *Subject Headings:* **1. Upper air data 2. Tropopause height data 3. Tropopause temperature 4. Upper air temperature variations 5. Europe.**—*M.P.K.*

1910

5D–19 551.511

Exner, Felix M., **Grundzüge einer Theorie der synoptischen Luftdruckveränderungen, I–III Mitteilungen.** [Fundamentals of the theory of synoptic atmospheric pressure variation, Parts I–III.] *Akademie der Wissenschaften, Vienna, Math.-Naturwiss. Klasse, Sitzungsberichte*, Abt. IIa, 115(7):1171–1246, **1906**; 116(4):819–854, **1907**; 119(5):697–738, **1910.** diagrs., charts, eqs. **DLC**—In the first part of this elaborate study of the pressure and temperature "balance" of the atmosphere, EXNER uses data for the U.S.A. to construct synoptic charts of constant pressure (Jan.) at the 492, 409 and 217 mm levels (approximately 3.5, 5 and 10 km). These charts show the strong N–S gradient of height contours, and a lower surface in the heart of the continent than on the East or West Coasts. These charts are shown to have prognostic value with respect to pressure changes, winds, etc. The theory which is worked out extensively in the three studies explains the thermodynamic balance which the author thinks must take place. If a layer is warmer than its surroundings the resulting vertical motion will cause higher and thus colder surfaces above—compensating for the extra heat. He thus explains his model of the tropopause, wherein 5 different tropopause types are indicated on one chart, corresponding to different sections of a low pressure system. The height and temperature of the discontinuity (tropopause) is calculated for 13 sectors, ranging from 7.8 km (−43.7°C) for the NWM gradient to 13.4 km (−67.4°C) for the S_1 gradient (south transitional). Above 20 km the temperature and pressure must be constant everywhere, due to the compensation, according to the theory. *Subject Headings:* **1. Tropopause models 2. Cyclone structure 3. Constant pressure charts.**—*M.R.*

5D–20 551.510.52/3:551.510.534

Humphreys, W. J., **Latitude effect on the temperature and height of the upper inversion.** *Mount Weather Observatory, Bulletin*, 2(5):292–297, May **1910.** table, refs., eqs. **DWB**—Increase of tropopause height and decrease of temperature with decrease of latitude attributed to the lack of ozone and to the diathermanous quality of the upper air in equatorial regions. Mention made of the effects of auroral activity and changes in violet solar radiation on the amount of ozone (and related capacity to absorb terrestrial radiation) in the outer atmosphere. *Subject Headings:* **1. Latitudinal variation of tropopause 2. Ozone.**—*M.P.K.*

5D–21 551.524.7:551.510.52/3

Humphreys, W. J., **Vertical temperature gradient as modified by seasons and by storm conditions.** *Mount Weather Observatory, Bulletin*, 2(4):183–192, April **1910.** 5 figs., eqs. **DWB**—Graphic comparison of average winter and summer gradients and of average winter and summer storm gradients (all based on European observations) show: 1) warmer temperatures in summer than in winter at all heights and at any given latitude; 2) high tropopause, cold stratosphere and warm troposphere associated with a high pressure area; and 3) low tropopause, warm stratosphere and cold troposphere associated with a low pressure area. Temperature inequalities accompanying barometric differences appear to be due to the unequal radiating powers of moist and dry air. *Subject Headings:* **1. Tropopause height-pressure-temperature correlations 2. Temperature of the stratosphere 3. Vertical temperature gradient 4. Europe.**—*M.P.K.*

5D–22 551.510.52/3

*Peppler, Albert, **Temperatur- und Druckgefälle in grossen Höhen.** [Temperature and pressure gradient in high altitudes.] *Beiträge zur Physik der freien Atmosphäre*, Leipzig, 4(1):13–23, Nov. 25, **1910.** tables. **DLC**—Aerological data from a number of expeditions at sea and stations on the land in various latitudes are compiled by latitude zones from N. Europe to the Equator. The mean conditions at each km level to 16 km are computed and compared analytically. The tropopause height is shown to range from 10.7 km in N. Europe to 15.2 km in the equatorial belt. A temperature reversal in the stratosphere is shown to exist, and a consequent wind reversal (pole to equator) suggested. The thermal equator is shown to be N of the true equator. *Subject Headings:* **1. Tropopause height data 2. Latitudinal variation of tropopause.**—*M.R.*

1911

5D–23 551.510.52/3

Dines, W. H., **The height of the isothermal zone.** *Royal Meteorological Society, Quarterly Journal*, 37:242, **1911.** Also in: his "Collected Scientific Papers." London **1931.** p. 219. **DWB**—

Short note pointing out the close linear relation between tropopause height and air pressure in the strata between 8 and 10 km over Britain, Europe and Russia. *Subject Headings:* **1. Tropopause height 2. Upper air pressure 3. Tropopause pressure correlations.**—*M.P.K.*

5D–24 551.524.7:551.513

*Dines, W. H., **The vertical temperature distribution in the atmosphere over England, and some remarks on the general and local circulation.** *Royal Society of London, Philosophical Transactions, Ser. A*, 211:277–278, **1911.** Also in his: "Collected Scientific Papers." London **1931.** p. 220–221. **DWB**—Using 200 representative soundings out of 250 records obtained from 400 balloon ascents over England (14 in Scotland and 6 in Ireland), the mean monthly temperatures at each even km from 0–14 are calculated, corrected for pressure and smoothed and compared with similar data compiled for the continent by GOLD, WAGNER and RYKACHEV (Russia). Lapse rates are computed for each 0.5 m level. On June 2–3, 1909, 25 balloons were sent up at hourly intervals (21 recovered) at Manchester to show the diurnal changes in the atmosphere and also in instrumental accuracy. The tropopause is discussed, though no name had at that time been assumed to it. Its height is called H_c and its temperature T_c. The mean H_c differs from individual values of H_c. In most cases (3 out of four) H_c is definite and is the point where the mean temperature occurs. If not definite, then 1°C/km is used as the criteria. Although H_c and T_c are closely correlated, they do not produce a straight line scatter. Average is 3°C/km change, whether with latitude or cyclonic change. Annual change is erratic and no daily change in H_c had yet been detected. From serial ascents on International Days it was evident that waves or series of waves occurred on the H_c boundary with an amplitude of 0.5 to 1.0 km and a T_c change of 5°C or more. From GOLD's (1908) theory it is evident that air that is colder than its surroundings must be air that has recently risen. A model based on English data shows the temperature and pressure and temperature anomaly distribution from 0–20 km over a range of pressure from 29.00 to 30.50 inches as one goes from a cyclonic to anticyclonic center. Low H_c over a LOW and high over a HIGH are explained on this model. *Subject Headings:* **1. Vertical temperature gradient 2. Tropopause theory 3. Tropopause height 4. England.**—*M.R.*

5D–25 551.510.52/3

Humphreys, W. J., **The height and temperature of the isothermal region at different latitudes and under different conditions.** *Mount Weather Observatory, Bulletin*, 4(3):136–142, Nov. **1911.** 2 tables, eqs., refs. **DLC**—The only objection to the radiation theory of height and temperature of the tropopause and stratosphere lies in the fact that in the tropics the stratosphere is colder than in the Arctic, whereas the earth is warmer. The theory can be brought into agreement with observation by considering the prevalence of cirrus in the equatorial regions as the cause of the cold stratosphere. The cirrus would shield the outer atmosphere from low level radiation and allow it to become colder. Excess heat below the cirrus level would expound the atmosphere and increase the horizontal flow to high altitudes. *Subject Headings:* **1. Tropopause temperature 2. Cirrus effects 3. Tropical tropopause 4. Tropopause theory.**—*M.R.*

5D–26 551.524.4

*Peppler, Wilhelm, **Die Zustandskurve der Temperatur im oberen Teil der Troposphäre und beim Übergang in die Stratosphäre nach den Lindenberger Registrierballonaufstiegen.** [Temperature gradient in the upper part of the troposphere and at the transition to the stratosphere based on Lindenberg recording balloon ascents.] *Lindenberg. Aeronautisches Observatorium, Arbeiten* 7:253–259, **1911.** 5 figs., 8 tables. **DWB**—Lindenberg soundings show a lower tropopause over low pressure than over high pressure areas with the region of greatest temperature decrease (steepest lapse rate) at a higher level over high pressure. Dependence of temperature profiles on air pressure and cirrus clouds discussed. The four basic atmospheric states related to the various types of vertical temperature distribution are mentioned. *Subject Headings:* **1. Vertical temperature gradient 2. Tropopause height data 3. Lindenberg, Germany.**—*M.P.K.*

5D–27 551.587(47)

*Rykachev, M. A., **Einige Ergebnisse der Registrierballonaufstiege in Russland.** [Some results of recording balloon ascents in Russia.] *Meteorologische Zeitschrift*, 28(1):1–16, Jan. **1911.** 7 figs. 10 tables. French trans. of paper in: *Académie Impériale des Sciences de St. Petersbourg, Bulletin.* Original unchecked. **DWB**—Discussion and tabulation of data from 63 registering balloon ascents at Pavlovsk, 32 at Kutchino and 18 at Nizhniĭ-Olchedaev, 1902–1909. Data, tabulated by months, seasons and pressure pattern (cyclonic or anticyclonic), show in almost all cases a temperature inversion somewhere between 10,000 and 15,000 m. *Subject Headings:* **1. Sounding balloon data 2. Tropopause height data 3. Tropopause temperature data 4. U.S.S.R.**—*M.P.K.*

5D–28 551.510.52/3

Schmauss, A., **Höhe, Temperatur und Luftdruck an der Grenze von Troposphäre und Stratosphäre über München.** [Height, temperature and pressure on the border between troposphere and stratosphere over Munich.] *Meteorologische Zeitschrift*, 28:513–518, Nov. **1911.** 3 figs., refs., eqs. **DWB**—It is concluded that the beginning of the stratosphere is related to a specified temperature rather than pressure. Tropopause waves are mentioned and the relation of their crests to surface high pressure and their troughs to surface low pressure pointed out. Author feels that from pilot balloon data, more precise values may be determined for the top of the troposphere than for the bottom of the stratosphere. *Subject Headings:* **1. Tropopause height 2. Tropopause temperature 3. Tropopause waves 4. Munich, Germany.**—*M.P.K.*

1912

5D–29 551.587

*Peppler, Albert, **Zur Aerologie niederer Breiten.** [On the aerology of the low latitudes.] *Beiträge zur Physik der freien Atmosphäre*, 4:222–230, **1912.** tables. **DWB**—Analysis of data obtained May–Sept. 1907 by Teisserenc de Bort and Rotch in the trade wind and equatorial Atlantic with respect to lapse rates in each km level from 0 to 17 km, and 0–5, 5–10, 10–15 and 0–15 km intervals for three zones: 1) 2½°S–22½°N; 2) 22½–37½°N; 3) Europe. Also mean temperature for each km level 0–16 km for these zones shows tropopause at 11–12 km over Europe, 14–15 km over the trade wind zone and not reached at 15 km over the tropics. Temperature, pressure and wind gradients both vertical and horizontal also treated and shown graphically. In the 25–30°N latitude zone there is a sharp wind discontinuity near tropopause level. A powerful warming was found at 25°N from 14–18 km. *Subject Headings:* **1. Tropical tropopause 2. Marine meteorology 3. Tropical Atlantic.**—*M.R.*

5D–30 551.510.52/3

Schmauss, A., **Temperaturwellen an der Grenze von Troposphäre und Stratosphäre.** [Temperature waves on the border between the troposphere and the stratosphere.] *Bavaria. Landeswetterwarte. Deutsches Meteorologisches Jahrbuch*, v. 34, **1912.** Append. G. 9 p. 7 figs., tables. *Münchener Aerologische Studien*, No. 1. **DWB**—Waves on the tropopause (period, several days; amplitude, 1–2 km) are used to explain the four distinct vertical temperature distributions which are known to be unrelated to any specific pressure pattern. *Subject Headings:* **1. Tropopause waves 2. Vertical temperature distribution.**—*M.P.K.*

5D–31 551.510.52/3

Schmauss, A., **Vertikalbewegungen der Atmosphäre an der Grenze von Troposphäre und Stratosphäre.** [Vertical motion of the atmosphere at the tropopause.] *Meteorologische Zeitschrift*, 29:193–197, **1912.** 4 figs. **DWB**—A sounding made at Munich on May 4, 1911 showed an irregular isothermal layer from 11.6 km to 12.5 km. At first sight the tropopause would be placed at 11.6 km, but consideration of the rapidly increased vertical velocities in the 11.6–12.5 km layer, 1.0 to 3.5 m/sec, and the change of wind direction to E at 12.5 km would indicate the tropopause was at the higher level. The wind and vertical motion in the substratosphere were related to the synoptic situation over Europe at the time. *Subject Headings:* **1. Vertical motion at tropopause 2. Tropopause types 3. Vertical velocities 4. Munich, Germany.**—*M.R.*

1913

5D–32 551.521

Emden, R., **Über Strahlungsgleichgewicht und atmosphärische Strahlung.** [On radiation equilibrium and atmospheric radiation.] *Akademie der Wissenschaften, Munich, Math.-Phys. Klasse, Sitzungsberichte*, No. 1:55–142, **1913.** 2 tables, refs., 102 eqs. **DLC**—This is a fundamental paper on the formation and temperature of the stratosphere and tropopause by radiation exchange mechanisms. Gold's theory that the outgoing and incoming radiative flux in a given layer was equal, is criticized and a theory advanced based on a 2 strata atmosphere: 1) a stratosphere without water vapor, and 2) a troposphere with a known amount of water vapor. Assuming that the 2 strata act as unequally gray bodies, a model of the temperature at various levels in the atmosphere is derived. This model gives a temperature of −57°C from 9.5 km to the top of the atmosphere with a minimum at 11.5 km and increasingly steep lapse rates from the tropopause to the ground. *Subject Headings:* **1. Radiation balance 2. Tropopause models 3. Tropopause theory. I. Gold, E. E.**—*M.R.*

5D–33 551.506.7

*Gold, Ernest, **The international kite and balloon ascents.** *Great Britain. Meteorological Office, Geophysical Memoirs*, No. 5, **1913.** 144 p. 25 plates, 35 tables, eqs. **DWB**—A comprehensive

discussion and extensive tabulation of kite, registering balloon, pilot balloon and manned balloon data (mostly 1903–1910) from England, France, Germany and Belgium. The first major subdivision is devoted to variations in vertical temperature gradients and includes a section (p. 110–129) entitled "The stratosphere" which contains considerable data on tropopause height and temperature as related to seasons, pressure and latitude. The second subdivision deals with wind variations in the vertical. *Subject Headings:* **1. Upper air data 2. Tropopause height data 3. Upper air temperatures 4. Upper air winds 5. England 6. Northwest Europe.**—*M.P.K.*

5D–34 551.510.52/3

Schmauss, A., **Der extreme Typus IV der Temperaturzustandskurve.** [The extreme type IV of the temperature gradient.] Reprint from *Bavaria. Landeswetterwarte. Deutsches Meteorologisches Jahrbuch*, 35(3), **1913.** 6 p. 8 figs. *Münchener Aerologische Studien*, No. 3. **DWB**—Discussion of cases of very low tropopause (5+ km) at Munich and Vienna which occurred when those cities recorded strong NW wind and were in the S or W sector of very deep low pressure systems. *Subject Headings:* **1. Extreme low tropopause 2. Munich, Germany 3. Vienna, Austria.**—*M.P.K.*

1914

5D–35 551.587(794)

*Blair, William R., **Free-air data in Southern California, July and August, 1913.** *Monthly Weather Review*, 42(7):410–419, July **1914.** 4 tables, 7 refs. German summary by Julius Hann in *Meteorologische Zeitschrift*, 34:325–6, **1917. DLC**—The conditions of soundings made at Avalon on Santa Catalina Island and data obtained therefrom are reported in this article. Out of 23 daily ascents made between July 23 and Aug. 12, 1914, 10 reached the tropopause, and one reached 32.6 km (July 30), the highest yet attained in America. The tropopause ranged from 12 to 15 km on individual ascents but the minimum temperature was at or above 18 km (from 16–18 km nearly isothermal) on the 7 ascents reaching 18 km. Mean values of temperature, humidity and wind are given for each km level, as well as the original data for significant points. *Subject Headings:* **1. Tropopause data 2. Sounding balloon ascents 3. Avalon, Santa Catalina Island, California. I. Hann, Julius.**—*M.R.*

5D–36 551.558:551.510.52/3

Dietzius, Robert, **Vertikale Luftströmungen an der Grenze zwischen Troposphäre und Stratosphäre.** [Vertical air currents on the border between troposphere and stratosphere.] *Beiträge zur Physik der freien Atmosphäre*, 6(3):165–172, **1914.** refs. **DLC**—The theory, set forth by Schmauss (1914), that there is a mean vertically ascending motion in the substratosphere is shown by the author to be insupportable if for no other reason than that the troposphere would soon become void of air. The more rapid rate of ascent of the sounding balloons in this layer is thought to be more likely due to the changes in contrast between the temperature of the gas in the balloon and that in the surrounding medium. In the case of a steep lapse rate this difference becomes greater, whereas in cases of isothermal or inversion layers the difference diminishes or reverses. *Subject Headings:* **1. Balloon ascension rates 2. Tropopause turbulence 3. Vertical motion at tropopause 4. Substratosphere.**—*M.R.*

5D–37 551.524.3:551.543

*Köppen, W. and Wedemeyer, F., **Beziehungen zwischen Temperatur, Luftdruck und Höhe der Troposphäre im europäischen Flachlande.** [Relations between temperature, pressure and height of the troposphere in the European plains.] *Meteorologische Zeitschrift*, 31(1):1–15, 75–87, **1914.** 12 figs., 13 tables, refs. **DWB**—An elaborate statistical and synoptic analysis is made of 203 soundings made at a number of stations in Europe prior to 1913. The height and temperature of the point at which the temperature gradient became $\geq 0.5°C$/km, and the pressure and temperature at sea level, 1, 4, 7, and 10 km levels are tabulated individually, by months and the monthly and seasonal means compounded and intercorrelated. These parameters are also analyzed according to quadrant of cyclone or anticyclone in which the ascent was made, and general rules promulgated on the basis of the regression equations. *Subject Headings:* **1. Pressure-temperature correlations 2. Statistical analysis 3. Tropopause height data 4. Synoptic studies 5. Europe.**—*M.R.*

5D–38 551.510.52/3

Schmauss, A., **Die Jahresperiode von T_c und H_c über München.** [The annual period of T_c and H_c over Münich.] *Bavaria. Landeswetterwarte, Deutsches Meteorologisches Jahrbuch*, v. 36, Append G, **1914.** 4 p. 5 figs., 2 tables, ref. *Münchener Aerologische Studien* No. 7. **DWB**—Investigation revealed that in summer over Munich a non-thermally induced increase in tropopause height and decrease in temperature occurred. Such behavior of the "upper inversion" distinguishes

it from temperature inversions at lower levels. The explanation of the summertime phenomenon must lie in some temperature condition in tropical latitudes which, under the influence of dynamic processes, leads to essentially lower temperatures aloft than those explainable by the radiation balance. *Subject Headings:* **1. Tropopause height 2. Tropopause temperature 3. Munich, Germany.**—*M.P.K.*

5D–39 551.510.52/3

Schmauss, A., **Die Substratosphäre.** [The substratosphere.] *Beiträge zur Physik der freien Atmosphäre*, 6:153–164, 1914. figs., refs. **DWB**—From Munich sounding balloon records, 1907–1912, four types of tropopause were distinguished and illustrated (though the term tropopause was not yet in use at that time), and the term substratosphere (SHAW) adopted for the layer of varying depth which occurs at the base of the stratosphere. Examples of serial ascents show wave motion on the tropopause which is independent of surface pressure changes. Those changes in height and temperature of tropopause are regular and in the layer involved there is a noticeable amount of turbulence, resulting from steep lapse rates, which produces a vibration of the meteorograph pen and a change in ascension rate of the balloon when compared with that in stable layers. It is supposed that cyclones and anticyclones may be wave phenomena on the tropopause of a greater order of magnitude than those shown here. *Subject Headings:* **1. Tropopause types 2. Substratosphere 3. Tropopause waves 4. Munich, Germany.**—*M.R.*

1916

5D–40 551.506.7:551.510.52/3

*Van Bemmelen, W., **Results of registering balloon ascents at Batavia.** *Indonesia.* (*K.*) *Magnetisch en Meteorologisch Observatorium te Batavia, Verhandelingen*, No. 4, **1916.** 57+109 p. 18 tables (1 fold.) in text, plus 109 p. of tables. **DWB**—Details of each of 103 ascents made at Batavia in 1910–15 are given and the 66 useful ascents worked up and summarized. Tropopause height determined in 18 cases and temperature in 20 cases (15,200 to 19,050 m and 76.5° to 90.2°C). The height was greater and temperature lower in the rainy season than in the dry. *Subject Headings:* **1. Upper air soundings 2. Upper air temperature data 3. Tropopause height data 4. Tropopause temperature data 5. Batavia, Java.**—*M.R.*

1919

5D–41 551.506.7:551.510.52/3

*Dines, W. H., **The characteristics of the free atmosphere.** *Great Britain. Meteorological Office. Geophysical Memoirs*, No. 13:47–76, **1919.** 12 tables, refs. Also in his "Collected Scientific Papers." London **1931.** p. 317–346. **DWB**—Data to date for sounding balloon ascents all over the world are tabulated in various ways. A table gives height of tropopause (*sic*) H_c, number of observations, amplitude in km and date of minimum. Correlation coefficients between tropopause height and numerous other parameters show highest positive correlation for H_c against T_m (mean temperature 1–9 km) and H_c against P_9 (pressure at 9 km) = +0.79 and +0.84, respectively. Partial correlation shows $\delta H_c = -.09\delta T_m + .96\delta P_9$ indicating that the important factor is P_9 and that T_m merely enters into the P_9 to a great extent. The effect of water vapor seems to be negligible. Standard deviation of H_c is 1.5 km. *Subject Headings:* **1. Tropopause height-pressure-temperature correlations 2. Sounding balloon data.**—*M.R.*

5D–42 551.524.7:551.510.53

Humphreys, W. J., **Minimum temperature at the base of the stratosphere.** *Monthly Weather Review*, 47(3):162, March **1919.** Also: **Why there are no clouds in the stratosphere.** *Ibid.*, p. 162–163. fig. **DLC**—In the first note, HUMPHREYS tries to explain the fact that the tropopause is usually a point of much lower temperature than the layers above or below and hence is not in thermal equilibrium. Anticyclonic blocking of the westerlies forces the latter to override these blocks and produce dynamic expansion and cooling. In the second article he explains lack of clouds in stratosphere on basis of very low humidities prevailing there. These low humidities are thought to be caused by a continental influx of cold air which loses its moisture and subsides without any appreciable influx of moisture from convection as is found in the troposphere. *Subject Headings:* **1. Tropopause temperature 2. Stratospheric humidity 3. Blocking action.**—*M.R.*

1921

5D–43 551.524.3:551.543:551.587

*Schedler, Anton, **Die Beziehungen zwischen Druck und Temperatur in der freien Atmosphäre.** [Relationship between air pressure and temperature in the upper atmosphere.] *Beiträge zur Physik der freien Atmosphäre*, 9(3):181–201, **1921.** 6 figs., 5 tables, refs. **DLC**—A detailed study

of the relations and correlations between pressure at the 0, 2500 m, 7000 m, and tropopause levels and temperature or movements of cyclones or anticyclones, with much data from aerological soundings given in tables and cross sections, etc. The model shows both cold and warm air columns leaning toward the east with increasing height and the temperature of the tropopause completely out of phase with the temperature at the lower levels and with the height of the tropopause and troposphere pressure. *Subject Headings:* **1. Tropopause steering 2. Tropopause-pressure-temperature correlations 3. Cross sections.**—*M.R.*

5D–44 551.509.312:551.510.52/3

von Ficker, Heinrich, **Bemerkungen über die Konstitution zusammengesetzter Depressionen.** [Notes on the structure of merged depressions.] *Meteorologische Zeitschrift*, 38(3):65–70, March **1921.** 4 figs. **DLC**—The interrelationships of barometric troughs or cyclones in the lower and upper troposphere and the lower stratosphere are shown schematically and discussed analytically with respect to the fact that, in general, southerly currents are warm and northerly cold in the lower troposphere, and the reverse is true in the stratosphere. There is not much difference in temperature between polar and tropical air. Dynamic and synoptic consequences of the vertical juxtaposition of lower and upper systems are treated recognising that there are various possible combinations but various stages of merging. *Subject Headings:* **1. Tropopause dynamics 2. Upper level cyclones 3. Differential kinematics.**—*M.R.*

5D–45 551.524.3:551.543:551.515.53

von Ficker, Heinrich, **Die Beziehungen zwischen Druck und Temperatur in der freien Atmosphäre.** [Correlations between pressure and temperature in the upper atmosphere.] *Beiträge zur Physik der freien Atmosphäre*, Leipzig, 10(1):51–62, **1921.** figs., tables. **DLC**—Pressure and temperature changes at the surface, 2500 m, 7000 m and at the tropopause are intercorrelated (212 cases for Europe) and the conclusion drawn that the changes in the substratosphere are more important for subsequent surface pressure changes than are equal changes in the lower troposphere or at surface. One paragraph is devoted to stratospheric and tropospheric composition. Secondary effects are also considered. *Subject Headings:* **1. Tropopause-pressure-temperature correlations 2. Substratosphere 3. Stratospheric composition.**—*M.R.*

1922

5D–46 551.511:551.510.52/3

*Berek, M., **Ueber die zeitliche Aenderung des vertikalen Temperaturgefälles in der freien Atmosphäre.** [Time variation of the vertical temperature gradient in the upper atmosphere.] *Beiträge zur Physik der freien Atmosphäre*, Leipzig, 10(2/3):63–90, **1922.** 5 figs., tables, refs., eqs. **DLC**—The dynamics of vertical motions in the troposphere and stratosphere and the interrelated vertical temperature gradients, inversion formation, tropopause formation, etc. are treated theoretically and graphically on the basis of aerological soundings up to date of publication. The data on lapse rates and vertical motion are segregated according to anticyclonic and cyclonic types. The differences encountered at the tropopause are remarkable. *Subject Headings:* **1. Tropopause theory 2. Vertical motion 3. Vertical temperature gradient.**—*M.R.*

5D–47 551.521

Milne, E. A., **Radiative equilibrium: the insolation of an atmosphere.** *Philosophical Magazine*, London, 6th Ser., 44:872–896, Nov. **1922.** refs., eqs. **DLC**—The theory of atmospheres in radiative equilibrium subject to insolation is considered. In paragraph 13 the radiation theory is applied to the determination of the level at which the boundary between the stratosphere and troposphere occurs under given conditions. The tropopause is taken to be boundary of the water-vapor atmosphere. The fact that EMDEN's (1913) theory regarding height and temperature of tropopause agrees with actual data obtained over England is attributed to the fact that the tropopause temperature over England is approximately the same as the mean temperature over the earth. The variation in height of tropopause with latitude may be due to increased absorption in polar regions and increased outward radiation of direct solar radiation must be counterbalanced by advection of warmth from lower latitudes. *Subject Headings:* **1. Tropopause theory 2. Radiation balance. I. Emden, R.**—*M.R.*

1923

5D–48 551.511:551.587

Mahalanobis, P. C., **On the seat of activity in the upper air.** *India. Meteorological Dept., Memoirs*, 24(1), **1923.** 10 p. 4 tables, refs., eqs. **DWB**—A critical statistical appraisal of the DINES-SHAW correlation coefficient theory that the substratosphere is the "seat of control" of pressure changes in the troposphere—which theory was attacked by EXNER and HESSELBERG and others. The correlation coefficients between the pressure and temperature at the surface and at

9 km, and the height and temperature of the tropopause are worked out for 66 ascents for SE England, and in addition for every 1 km level from the surface to the tropopause to see if any level exists which shows a better correlation than the 9 km level of the Dines-Shaw theory. Conclusion reached that the 2–4 km layer is more important statistically than the 9 km. *Subject Headings:* **1. Tropopause correlations 2. Stratospheric steering 3. Southeast England. I. Dines, W. H.**—*M.R.*

1925

5D–49 551.511:531.75:551.510.52/3

Defant, A., **Schwingungen einer zweifach geschichteten Atmosphäre und ihr Verhältniss zu den Wellen im Luftmeer.** [Fluctuations of a two layer atmosphere and their relations to waves in the atmosphere.] *Beiträge zur Physik der freien Atmosphäre*, 12:112–137, **1925.** fig., refs., 16 eqs. **DLC**—A theoretical treatment of the problem of gravity waves on the tropopause (as the boundary surface between the two layers of the atmosphere). The theory of free oscillators in incompressible fluids is first developed in detail and then applied to the atmosphere for the case of various temperature differences at the boundary, first for a stationary and then for a rotating earth, and then to free waves in mid latitudes on a rotating earth. This paper represents one of the fundamental contributions to a realistic model of the atmosphere in respect to long waves in the zonal flow. *Subject Headings:* **1. Tropopause waves 2. Tropopause steering.**—*M.R.*

5D–50 551.557.2:551.524.4

*Douglas, C. K. M., **On the relation between the source of the air and the upper air temperature up to base of the stratosphere.** *Royal Meteorological Society, Quarterly Journal*, 51:229–238, **1925.** 4 figs., tables. Discussion p. 237–238. **DLC**—Trajectories of air at 6 km level are traced backward from the place where sounding balloons were released for successive 24 hour periods up to 5 days, and the results used to correlate air movements with temperature and height of tropopause and pressure and temperature of various levels from surface to tropopause (by seasons). Highest positive correlations were between outward displacement 3 days before and height of tropopause. Highest negative correlation between same parameter and temperature of tropopause. Jet stream (belt of strong westerlies) of >100 mph was remarked to lie between coldest and warmest air in proximity, or where temperature gradient was strongest at high levels. *Subject Headings:* **1. Tropopause-height-pressure-temperature correlations 2. Air trajectories 3. Jet stream.**—*M.R.*

1926

5D–51 551.524.3:551.543

Exner, Felix M., **Über den Einfluss von Luftdruckänderungen auf die vertikale Temperaturverteilung.** [On the influence of pressure variations on the vertical temperature distribution.] *Annalen der Hydrographie und Maritimen Meteorologie, Köppen-Heft*, p. 20–26, **1926.** 2 figs., table, refs., eqs. **DWB**—Author explains theoretically how change of pressure in the upper air may affect temperature distribution throughout the column of air beneath. He shows graphically and by means of tables how pressure changes aloft influence the height of the tropopause. Theory is then expanded to help explain the dependence of tropospheric temperature distribution on the pressure circulation pattern aloft and the close correlation found by DINES (*see* 5D–41 above) between the pressure at 9 km and temperature below. *Subject Headings:* **1. Tropopause height 2. Vertical temperature distribution 3. Upper air pressure.**—*M.P.K.*

1928

5D–52 551.510.534:546.214

*Duckert, Paul, **Messungen des Ozongehaltes über Lindenberg.** [Measurements of ozone content over Lindenberg.] *Beiträge zur Physik der freien Atmosphäre*, 4(4):219–239, **1928.** 12 figs., 4 tables, refs., eqs. **DLC**—A scatter diagram shows a strong negative correlation between the height of the tropopause and the thickness of the equivalent ozone layer; based on 27 balloon ascents at Lindenberg, and the detailed ozone data obtained there during July–Oct. 1926 and April–Oct. 1927 (DOBSON's method). A stronger correlation exists between ozone thickness and density of air in stratosphere. A model temperature distribution extrapolated on the basis of acoustical soundings to 50 km height shows a warm region in the ozone layer at 40 km, reaching +37°C at 45 km. *Subject Headings:* **1. Tropopause ozone relationships 2. Ozone data 3. Stratospheric density 4. Temperature of the stratosphere 5. Lindenberg, Germany.**—*M.R.*

1929

5D–53 551.524.7:551.510.52/3

McGregor, C. J., **Temperature observations above 25 kilometers.** *American Meteorological Society, Bulletin*, 10(5):110–113, **1929.** tables. **DLC**—Tabular summary of seven sounding

balloon records in the U. S. and Europe, giving height of tropopause and temperature at tropopause as well as time, date and height of the sounding, surface pressure and temperature, height and degree of lowest temperature, ascension rate and time and temperature at extreme height attained. *Subject Headings:* **1. Sounding balloon data 2. Tropopause height data 3. Tropopause temperature data 4. United States 5. Europe.**—*M.P.K.*

5D–54 551.511:551.524.4

Ramanathan, K. R., **Distribution of potential temperature in the first 25 kilometers over the Northern Hemisphere.** *Nature*, London, 124(3127):509–510, Oct. 5, **1929.** 2 figs. **DWB**—Chart, similar to SHAW's ("Manual of meteorology," v. 2, p. 116), shows latitudinal distribution of potential temperature θ in summer and winter over Northern Hemisphere (0–26 km). The tropopause is shown as a solid black line ranging from 9.5 to 17 km and 323° to 384°A potential temperature, including results of 1928–9 sounding balloon observations at Poona (18°N) India. Chart shows marked trough just below tropopause at 25°N in summer. This trough is connected with marked rise in tropopause at that latitude and possibly with tropical cyclones at that season. Annual variation of θ with height at Agra shows similar dip in isentropes and rise in tropopause from May–Oct. *Subject Headings:* **1. Tropopause models 2. Tropopause potential temperature 3. Northern Hemisphere 4. Agra, India.**—*M.R.*

5D–55 551.524.4:551.510.52/3

Ramanathan, K. R., **Distribution of temperature in the first 25 kilometers over the earth.** *Nature*, London, 123(3109):834–835, June **1929.** 2 figs., refs. in text. **DLC**—Author presents a modified temperature cross section of atmosphere from 0–90°N for summer and winter, showing tropopause height and rise of temperature in stratosphere (especially in tropics), making use of more recent data than SHAW had available in Vol. 2 (p. 100) of "Manual of meteorology." Principal features of new chart are enumerated. Annual regime of tropopause height at Batavia compared with that at Agra, showing inverse shape of curves. *Subject Headings:* **1. Mean tropopause height 2. Tropopause models 3. Tropical tropopause 4. Agra, India 5. Batavia, Java.**—*M.R.*

1930

5D–56 551.524.7(54)

*Chatterjee, G. and Sur, N. K., **The thermal structure of the free atmosphere over Agra.** *Beiträge zur Geophysik*, 25(3/4):266–278, **1930.** 8 figs., 2 tables. **DLC**—Monthly temperature-height curves for Agra, based on over 100 ascents into the stratosphere (16–18 km tropopause), and corresponding data are presented and analyzed. Tropopause temperature is lowest in monsoon (warmest season <14 km) season and highest in winter. The variations in temperature of the tropopause are also greatest in winter and least in the monsoon season (June–Aug.). Three types of tropopause are recognized: a) sharply defined inversion, b) sharply defined decrease in lapse rate, and c) gradually decreasing lapse rate. Lowest temperature at tropopause was −92°C which agrees with Batavia, Java, extreme (at heights of 16.5 and 17 km, respectively). *Subject Headings:* **1. Atmospheric structure 2. Tropopause temperature data 3. Tropopause types 4. Agra, India.**—*M.R.*

5D–57 551.587(54)

*Ramanathan, K. R., **Discussion of results of sounding balloon ascents at Agra during the period July 1925 to March 1928 and some allied questions.** *India. Meteorological Dept., Memoirs*, 25(5), **1930.** 193 p. 14 figs., 23 tables, refs., appends. **DWB**—Analysis and discussion of the monthly mean temperature, humidity and pressure data and derived quantities like lapse rate, density and potential temperature obtained from sounding balloon ascents at Agra during the period July 1925–March 1928. Mean monthly pressure differences at different levels between Agra and Europe are considered in their relation to upper wind circulation. The different types of transition from troposphere to stratosphere over Agra are analyzed and the seasonal variation of the height and temperature of the tropopause discussed (15.0 dyn. km in Feb.; 16.5 in Aug.). The complementary nature of the variation of these quantities at Agra and Batavia is pointed out. Diagrams are given showing the probable distribution of temperature and potential temperature in the first 25 km of the atmosphere over the Northern Hemisphere in summer and winter. Numerous tables and charts included. (For similar data from Poona and Hyderabad *see* 5D–76 below.) *Subject Headings:* **1. Sounding balloon data 2. Tropopause height 3. Tropopause temperature 4. Agra, India.**—*Author's abstract.*

5D–58 551.510.52/3

Reger, Josef, **Die Grenze zwischen Troposphäre und Stratosphäre.** [Boundary between troposphere and stratosphere.] *Lindenberg. Aeronautisches Observatorium, Arbeiten*, 16:E2–E6.

1930. 3 tables, graphs, refs. **DLC**—The tropopause in different latitudes is shown to be quite irregular in N–S cross section, but the mean 381° potential temperature isotherm gives quite a regular boundary to the stratosphere either in cross section or in time section. The area between the top of the troposphere (tropopause) and the base of the stratosphere (381°A) an area 1–5 km in depth is called the substratosphere. Graphic models, and data on which they are based, are presented. The value of 381°A was based on the highest tropopause (15 km) observed at Lindenberg (July 12, 1928) out of 300 ascents. *Subject Headings:* **1. Tropopause models 2. Substratosphere.**—*M.R.*

1931

5D–59 551.524.3:551.543

*Palmén, Erik, **Die Beziehung zwischen troposphärischen und stratosphärischen Temperatur- und Luftdruckschwankungen.** [Correlation between tropospheric and stratospheric temperature and atmospheric pressure variations.] *Beiträge zur Physik der freien Atmosphäre*, 17(2):102–116, **1931.** 8 figs., refs. **DLC**—After some general remarks on the variations in height and temperature of the tropopause with changes in air flow, air mass or cyclonic conditions, an example from the International Aerological Days (14–16 April, 1925) of the changes during passage of a deep cyclone from the Atlantic to Scandinavia is analyzed by the well known Palmén synoptic-aerological method. The lowest tropopause was 5 km (−30°C) over Scotland. Such a low tropopause could not be explained merely by advection, but must be caused by a powerful sucking down of the stratosphere in the vortex of a deep cyclone (tropopause funnel). The large changes in pressure and temperature of the substratosphere are, then, partially due to advection and partially to dynamic or convective action in the troposphere. These changes are partially compensated in the troposphere so that changes at the surface are not as violent. *Subject Headings:* **1. Tropopause funnels 2. Extreme low tropopause 3. Synoptic aerological studies 4. Northwest Europe.**—*M.R.*

5D–60 551.506.7:551.507.322

Weickmann, L. and Molchanov, P., **Kurzer Bericht über die meteorologisch-aerologischen Beobachtungen auf der Polarfahrt des "Graf Zeppelin."** [Brief report on the meteorological-aerological observations on the Polar expedition of the "Graf Zeppelin."] *Meteorologische Zeitschrift*, 48(11):409–414, Nov. **1931.** 6 figs., 2 tables, refs. **DWB**—Diagrams and tables indicate tropopauses slightly above 10 km observed on the first Arctic expedition of the dirigible, "Graf Zeppelin," July 26–31, 1931. *Subject Headings:* **1. Upper air data 2. Tropopause height 3. Dirigible expeditions 4. Arctic.**—*M.P.K.*

1932

5D–61 551.515

*§Bjerknes, J., **Exploration de quelques perturbations atmosphériques à l'aide de sondages rapprochés dans le temps.** [Investigation of certain atmospheric disturbances by means of consecutive soundings.] *Geofysiske Publikasjoner*, 9(9), **1932.** 52 p. 32 figs., charts, tables, eqs. **DWB**—This monograph comprises the first major synoptic-aerological study of two actual weather situations (Dec. 26–28, 1928 and March 29–30, 1928) giving special attention to perturbations on the tropopause. By means of time and longitudinal or latitudinal cross sections (based on aerological soundings in Europe), the author shows the relation between waves on the polar front and waves on the tropopause (in the case of a developing cyclone). The initial disturbance is shown to occur in the troposphere and the changes in tropopause height and temperature follow those impulses. The tropopause structure, speed of propagation, movement of particles of air and the mechanism which links the tropopause waves with polar front waves are taken up separately and illustrated with schematic diagrams in Chap. III (p. 29–39). *Subject Headings:* **1. Synoptic aerological studies 2. Tropopause waves 3. Cyclone development 4. Western Europe.**—*M.R.*

5D–62 551.511 551.543

*Palmén, Erik, **Versuch zur Analyse der dynamischen Druckschwankungen in der Atmosphäre.** [Attempt at an analysis of dynamic pressure variations in the atmosphere.] *Beiträge zur Physik der freien Atmosphäre, Bjerknes Festband*, 19:55–70, **1932.** 6 figs., 4 tables, refs. **DWB**—In this article which attempts to show the proportion of the influence which produces pressure changes at the surface which can be attributed to advection (air mass movements) and that which is due to dynamic action, and at what levels (lower or upper troposphere or stratosphere) the seat of the action is located, the author presents many illustrative diagrams of cases of vertical motion and regeneration of the high tropopause and of wave motion in the tropopause region during cyclones, etc. and attempts to explain these motions. *Subject Headings:* **1. Tropopause regeneration 2. Dynamic pressure changes 3. Tropopause waves.**—*M.R.*

5D–63 551.511:551.521.3

Pekeris, Chaim Leib, **Development and present status of the theory of the heat balance in the atmosphere.** Cambridge, Mass., **1932.** 80 p. 11 figs., 10 tables, 37 refs., eqs. Mimeo. **DWB**—Advances to 1930 in the theory of radiation balance in the troposphere and stratosphere are summarized and the separate theories of HUMPHREYS (1909), GOLD (1909), EMDEN (1913), HERGESELL (1919), MILNE (1922), MÜGGE (1926), SIMPSON (1929), ABBOT (1929) and MÜGGE (1929) reviewed in detail in the several chapters. The theory of EMDEN is considered the most adequate though needing considerable refinement to eliminate absurd results with respect to supersaturation following the steep lapse rates hypothesis. Selective absorption is the key to a better understanding of the radiation balance, especially the absorption by H_2O and CO_2. *Subject Headings:* **1. Radiation balance 2. Tropopause temperature 3. Review articles.**—*M.R.*

5D–64 551.521:551.510.52/3

*Ramanathan, K. R., **Effect of radiation on the equilibrium of the higher layers of the troposphere and the nature of the transition from troposphere to stratosphere.** *Beiträge zur Physik der freien Atmosphäre,* 18(3):196–208, **1932.** 8 figs., 4 tables, 15 refs. **DWB**—Net radiation and absorption from different layers of the atmosphere is calculated assuming precipitable water in stratosphere to be 0.0015 cm, 0.01 cm and 0.03, respectively, and taking into account all absorption bands due to water vapor in the 0.9 to 2.0μ layer and the CO_2 band near 2.7μ (assuming constant proportion of CO_2 as .03% in all layers), and for a relative humidity in troposphere of 100% and 25%, respectively, for each layer from 6 km below to 3 km above tropopause. Results are presented in extensive tables and curves and analyzed to explain the cold tropopause observed in tropical regions. It is shown that the great amount of moisture carried up to great heights in the tropics (partly due to greater convective activity and partly to higher temperatures at a given level of the mid troposphere allowing much greater saturation vapor pressure) and the dry air of the stratosphere conspire to produce a great outward radiation and small adsorption in the top levels of the stratosphere, resulting in a low temperature which in turn prevents additional moisture from penetrating into the stratosphere, thus maintaining the anomalous balance which is evident in the sharp cold tropopauses. Only the CO_2 seems to prevent an even greater anomaly as it is a poor absorber of atmospheric radiation and a good absorber of solar radiation and has a higher equilibrium temperature than has water vapor. *Subject Headings:* **1. Tropopause radiation balance 2. Tropical tropopause 3. Upper atmosphere radiation data.**—*M.R.*

5D–65 551.587(485)

†*Rolf, Bruno, **Lancers de ballon-sondes d'Abisko de 1921 à 1929.** [Balloon sonde ascents at Abisko from 1921 to 1929.] *Sweden. Meteorologiska och Hydrologiska Institut, Meddelanden,* 5(5), **1932.** 41 p. 12 figs., 9 plates, 14 tables, bibliog. p. 41. **DWB**—Discussion and tabulation of extensive balloon-sonde data from Abisko, Sweden (ca. 69°40′N, 19°W) includes tables (p. 22–27) showing temperatures at the tropopause and at various geodynamic levels, temperature gradients and temperature at the highest levels attained. Fig. 12 (p. 39) shows annual variation of temperature at the tropopause and at other levels. Graphic comparisons of various ascents indicate tropopause pressure and temperature. *Subject Headings:* **1. Tropopause temperature data 2. Sounding balloon data 3. Abisko, Sweden.**—*M.P.K.*

5D–66 551.510.52/3(54)

*Sur, N. K. and Roy, J. C., **On some characteristics of the tropopause and upper troposphere over north-west India.** *India. Meteorological Dept. Scientific Notes,* 5(48):19–31, **1932.** 8 figs., 8 tables, eqs. **DWB**—Chief feature of three principal types of tropopause over NW India discussed. Mention made of characteristic region of small lapse rate or inversion commonly found between 11.5 and 14 gkm. Physical features of an anticyclone in Upper India in Dec. 1930 are discussed in light of ROSSBY theory of advection of air-mass. Changes in temperature at different levels for a few successive days during the anticyclone calculated by ROSSBY's theory. *Subject Headings:* **1. Tropopause types 2. Anticyclones 3. Northwest India.**—*From authors' abstract.*

1933

5D–67 551.511:532.5(02)

Bjerknes, Vilhelm F. K.; Bjerknes, Jakob; Solberg, Havor S. and Bergeron, Tor, **Physikalische Hydrodynamik mit Anwendung auf die dynamische Meteorologie.** [Physical hydrodynamics with applications to dynamic meteorology.] Berlin, Julius Springer. **1933.** 797 p. 151 figs., refs. (p. 627–633), eqs. **DLC**—Starting (p. 627) from a basic definition and description of the tropopause, authors proceed to a discussion (illustrated by seasonal cross sections) of the latitudinal and seasonal variations in tropopause height and temperature. *Subject Headings:* **1. Physical hydrodynamics 2. Tropopause height 3. Tropopause temperature.**—*M.P.K.*

5D–68 551.509.317:551.515.11

Bjerknes, J. and Palmén, Erik, **Aerologische Analyse einer Zyklone.** [Aerological analysis of a cyclone.] *Beiträge zur Physik der freien Atmosphäre*, 21:53–62, **1933.** 8 figs., tables, refs. **DWB**—Analysis of a partially occluded cyclone March 28–30, 1928. Uccle registering sounding balloon data showed tropopause at ca 7.5 km (−48°C) in polar air ahead of the warm front and behind the cold front and about 3.5 km higher in the warm sector. Fig. 7, a vertical cross-section through both sectors of the cyclone, shows clearly the upward bulge of the tropopause over the warm sector. Both warm and cold front surfaces were found to reach up to the tropopause. Stability, moisture and temperature characteristics of the tropical and polar air masses commented on. *Subject Headings:* **1. Synoptic aerological studies 2. Tropopause height 3. Tropopause temperature 4. Cyclone analysis 5. Northwest Europe.**—*M.P.K.*

5D–69 551.524.4:551.510.52/3

Duperier, Arturo, **Distribución vertical de la temperatura en la atmósfera del centro de España.** [Vertical distribution of temperature in central Spain.] *Spain. Servicio Meteorológico Nacional, Publicaciones, Ser. A, Memorias*, No. 1, **1933. DWB**—An analysis of 132 balloon soundings made at Madrid reveals the mean height of the tropopause and the mean lapse rate over central Spain. The mean lapse rate curve is also shown for the special cases of low pressure, high pressure, and average pressure. *Subject Headings:* **1. Vertical temperature distribution 2. Tropopause height 3. Central Spain.**—*R. Quiroz.*

5D–70 551.515:551.510.53

†*§Palmén, Erik, **Aerologische Untersuchungen der atmosphärischen Störungen bei besonderer Berücksichtigung der stratosphärischen Vorgänge.** [Aerological investigation of atmospheric disturbances with particular attention to stratospheric processes.] *Finska Vetenskaps-Societeten, Helsinki, Commentationes Physico-Mathematicae*, 7(6):1–65, **1933.** 24 figs., 12 tables, 29 refs., eqs. **DLC**—This is one of the fundamental contributions to our knowledge of the *static* or thermal advective processes and the *dynamic* processes which produce temperature and pressure changes at the surface, the tropopause or any given layer of the atmosphere. The analysis is made from aerological soundings used in connection with surface and upper air synoptic charts, cross sections, stream line charts, etc., not neglecting pure theoretical aspects. The example from a cyclone April 14–16, 1925, shows a tropopause funnel and the movement of tropopause waves. Another case, the cyclone of March 28–31, 1929, illustrates the role of advective processes, although in this case the low (7.4 km) tropopause was partly due to dynamic (vertical subsiding motion above the tropopause) causes. The soundings of Oct. 12–13, 1932 show a tropopause of 5.85 km (<20,000 ft) at Sealand in the center of an old occlusion. Other stations had much higher and colder tropopauses, indicating that a dynamic heating was occurring in the center of the "tropopause funnel" where the stratosphere had subsided rapidly. Three other soundings over England and Norway during very low pressure (at the surface) show marked inversions just above the tropopause. Next a statistical analysis is made of tropopause temperature, lapse rates, pressure, potential temperature, etc. over England and Norway, respectively, for various tropopause types and based on sounding balloon records up to date of the study. Finally, a study is made of the levels which are most responsible for the changes which have been observed. In early stages of cyclonic development the advective processes are the most important and over Europe the levels from 4–7 km and 11–13 km are the most important. Changes are usually in the opposite direction in these levels and tropopause height variations of 3–5 km in a single day often occur. When occlusion begins, the dynamic processes (centrifugal and Coriolis forces) become predominant. In the early stages tropopause waves are frequent; in the later the "funnel" is noted and often the type of tropopause changes rapidly, or it becomes foliated and is unstable. Hence, it is not possible to generalize on the "controlling layers" of the atmosphere without consideration of synoptic aerological types. *Subject Headings:* **1. Tropopause funnels 2. Tropopause waves 3. Tropopause dynamics 4. Synoptic aerological studies.**—*M.R.*

5D–71 551.510.52/3

Ramanathan, K. R. and Ramakrishnan, K. P., **Distortion of the tropopause due to meridional movements in the sub-stratosphere.** *Nature*, London, 132:932, **1933.** fig., 4 refs. **DLC**—There is a well expressed discontinuity between the tropical tropopause and the tropopause of the moderate latitudes, which occurs usually in the latitudes 20–40°. In this zone (for example at Agra, 27°N), especially in the winter, a folded or multiple structure of the tropopause is usually observed, shown on a meridional cross-section through the atmosphere. *Subject Headings:* **1. Meridional cross sections 2. Multiple tropopause 3. Tropical tropopause 4. Agra, India.**—*A.A.*

1934

5D–72 551.510.53:551.583

Arctowski, Henryk, **Sur le rôle de la stratosphère dans les variations climatiques.** [The role of the stratosphere in climatic variations.] *Lvov. Uniwersytet. Instytut Geofizyki i Meteorologii, Komunikaty*, 7(85):193–226, **1934.** 17 figs., refs. **DLC**—Most of the aerological data summarized up to that time in the literature from various parts of the earth are analyzed graphically to show the discontinuities which occur at various levels at various time of the year, or from year to year. The tropical tropopause was suspected in reviewing data for Toronto and Uccle, but was attributed to the concept of REGER of the sub-stratosphere. Climatic changes are attributed to discontinuities at high levels, which may be in inverse relation to those at the surface and may be conditioned by changes at very high altitudes (100 km) due to changes in ozone or some other factor. *Subject Headings:* **1. Tropical tropopause 2. Climatic changes.**—*M.R.*

5D–73 551.506.7

*Ballard, J. C., **Some results of sounding-balloon observations during the second International Polar Year, August 1932 to August 1933, inclusive.** *Monthly Weather Review*, 62(2):45–53, Feb. **1934.** 6 figs., 4 refs., table. **DLC**—Numerous temperature-height curves are presented for Ellendale, Omaha and Dallas, based on 234 polar year sounding balloon flights up to 15 or 20 km. The annual variation in height of tropopause is shown in scatter diagrams for each of the 3 stations, indicating an absolute range from 6 to 17 km (Omaha and Ellendale) and 11 to 17 km (Dallas) and a smoothed or average range from 9 to 12.5 km at Ellendale, 9.5 to 15.5 km at Omaha, and 12.5 to 16.2 km at Dallas in winter and summer, respectively. The radiation error (night-day flights) is evaluated for all levels. *Subject Headings:* **1. Tropopause height data 2. Upper air temperature data 3. Radiation error in meteorograph flights 4. International Polar Year, 1932–1933 5. Omaha, Nebraska 6. Dallas, Texas 7. Ellendale, North Dakota.**—*M.R.*

5D–74 **Deleted**

5D–75 551.511:551.510.52/

Palmén, E. K., **Über die Temperaturverteilung in der Stratosphäre und ihren Einfluss auf die Dynamik des Wetters.** [On temperature distribution in the stratosphere and its influence on the dynamics of the weather.] *Meteorologische Zeitschrift*, 51(1):17–23, Jan. **1934.** 2 figs., 3 tables, refs. **DWB**—Author shows that the greatest atmospheric activity occurs in the winter when the equator-pole temperature difference attains its maximum value in the troposphere and its minimum in the stratosphere. Since the annual variation of the stratosphere equator-pole temperature difference is particularly large, it follows that the meridional stratospheric solenoidal field is less significant in the origin of atmospheric disturbances and low level pressure variation than is the troposphere. Meridional cross section (N. Pole–Equator) of Jan. and July atmospheric temperature fields shows tropopause height, temperature configuration and seasonal variation. *Subject Headings:* **1. Dynamics of the atmosphere 2. Temperature of the stratosphere 3. Tropopause.**—*M.P.K.*

5D–76 551.587(54

*Ramanathan, K. R. and Ramakrishnan, K. P., **Discussion of results of sounding balloon ascents at Poona and Hyderabad during the period October 1928 to December 1931.** *India. Meteorological Dept., Memoirs*, 26(4):51–77, **1934.** 12 figs., 26 tables. **DWB**—"A discussion of the monthly mean values of temperature, humidity, pressure and derived quantities like lapse-rate, density and potential temperature." Tropopause types are classified (p. 57–59) seasonally by height and abruptness of transition as indicated by the thickness of the transition layer and the occurrence of the composite tropopause. Twenty of 86 cases examined were non-composite; 66 were composite types. Mean heights and temperatures for various types tabulated by seasons (p. 59). *Subject Headings:* **Sounding balloon data 2. Upper air research 3. Tropopause height 4. Tropopause temperature 5. India.**—*M.P.K.*

1935

5D–77 551.510.52/

Hoffstedt, Hans, **Korrelationen zwischen Luftdruck, Temperatur und Tropopausenhöhe.** [Correlation between atmospheric pressure, temperature and height of tropopause.] *Finska Vetenskaps*

Societeten, Helsinki, Commentationes Physico-Mathematicae, 8(4):1–14, 1935. 4 tables, refs. **DLC**—Using 69 balloon soundings made in England in the winter (Oct.–March) of 1929–30, the author obtains correlation coefficients for each 1 km level from 0 to 19 km for potential temperature and temperature on tropopause height (H_T) and pressure vs. tropopause height, for the polar air masses (55 cases) and tropical air masses (14 cases), respectively. The highest correlation is about 0.90 between pressure at 4–10 km and H_T in polar air +0.8 in tropical air, 4–14 km, +0.80 to 0.85, 4 to 7 km in polar air, for temperature vs. H_T, and +0.61 to 0.78 from 2 to 10 km in tropical air. The correlation is strongly negative from 10 to 15 km in P and from 13 to 15 km in T between temperature and H_T whereas the positive correlation between pressure and H_T continues clear up to 19 km. *Subject Headings:* **1. Tropopause height-pressure-temperature correlations 2. Correlation coefficient 3. Tropopause potential temperature.**—*M.R.*

5D–78 551.510.52/3:551.509

Krick, Irving P., **Application of the theory of tropopause waves to weather forecasting (resumé).** *American Meteorological Society, Bulletin*, 16(10):225, Oct. **1935. DLC**—Krick explains high and low warm tropopause over anticyclones and deep cyclones, respectively, as due to what J. Bjerknes calls horizontal wave disturbances along the tropopause. He then tells how he has on this basis forecast a semi-permanent anticyclone over western North America at times when a semi-permanent low exists over the Gulf of Alaska, with pressure <29.00 inches (during autumn, winter and spring of 1934–5). *Subject Headings:* **1. Tropopause waves 2. Fair weather forecasting 3. Semipermanent pressure centers 4. California.**—*M.R.*

5D–79 551.509.317

*§Palmén, Erik, **Registrierballonaufstiege in einer tiefen Zyklone.** [Balloon ascents in a deep cyclone.] *Finska Vetenskaps-Societeten, Helsinki, Commentationes Physico-Mathematicae*, 8(3): 1–32, 1935. 14 figs., 9 tables, refs. **DLC**—A series of 6 balloon soundings were made at Ås, Norway, and 5 at Uccle, Belgium, on Feb. 2–3, 1933 at frequent intervals (2 to 8 hours apart) to determine the fluctuations of the tropopause and pressure in a deep cyclone. Surface synoptic charts, N–S cross sections, comparative temperature-height curves, etc. and numerous illustrative tables given. A comprehensive picture of time, space and air mass variations in height, temperature and potential temperature of tropopause is presented, and an attempt made to explain the changes in the tropopause. It was thought that these changes were partially advective and partially the result of vertical movement of the air masses caused by the cyclonic vortex formation. The regeneration of a higher tropopause after the tropopause funnel had passed could not be completely ascertained due to lack of data to the West. High winds (50 m/sec) at the tropopause over Uccle were noted. *Subject Headings:* **1. Tropopause funnels 2. Synoptic aerological studies 3. Jet stream 4. Ås, Norway 5. Uccle, Belgium.**—*M.R.*

5D–80 551.524.7:551.510.53

Raethjen, Paul, **Das Gegenläufigkeitsgesetz der Temperatur in Stratosphäre und Troposphäre.** [The law of contrast in temperature of the stratosphere and troposphere.] *Meteorologische Zeitschrift*, 52:418–424, **1935.** 3 figs., refs. **DWB**—The author considers two types of stratosphere-troposphere contrast. By "the cosmic opposition" is meant the normal situation whereby the stratosphere is warm in the Arctic and cold in the tropics, while the troposphere has the reverse situation. The "weather" or as we would say today the "synoptic reversal" is that which occurs in the day-to-day weather or air mass changes, and there are many exceptions to the "rule" that warm troposphere has cold stratosphere and vice versa. The rules and the exceptions in both cases are explained simply although by dynamic concepts (with schematic diagrams). The normal situation occurs with stable and the abnormal with the unstable lapse rates. Finally, the effects of surface friction and of stratospheric steering are considered. The entire troposphere is considered to be a frictional layer, so that the first level at which wave motion can be propagated independently is the tropopause level. This then is the level which controls the pressure changes in the troposphere. *Subject Headings:* **1. Tropopause waves 2. Stratospheric steering.**—*M.R.*

5D–81 551.543.3:551.510.52/3

*Zistler, P., **Ueber die Zusammenhänge zwischen troposphärischen und stratosphärischen Druckwellen.** [The relation between tropospheric and stratospheric pressure waves.] *Meteorologische Zeitschrift*, 52(11):424–429, Nov. **1935.** 3 figs., 7 tables, 18 refs., eqs. **DWB**—Using sounding balloon data for Munich, the author shows graphically the relationships between tem-

perature and height of tropopause, pressure at the surface, at 10 km, 18 km and 20 km; and mean temperature of stratosphere, for series of flights made on International Days. A statistical analysis of relationships is also presented. Stratospheric compensation, advection and tropopause waves are discussed and the relative contributions of the various factors analyzed. *Subject Headings:* **1. Tropopause waves 2. Stratospheric composition 3. Munich, Germany.**—*M.R.*

1936

5D–82 551.510.53:551.515.13

Baur, Franz, **Die Bedeutung der Stratosphäre für die Grosswetterlage.** [The importance of the stratosphere in the overall weather-situation.] *Meteorologische Zeitschrift*, 53(7):237–247, July **1936.** 17 figs., table, refs., eqs. Summary in: *Royal Meteorological Society, Quarterly Journal*, 63(272):471–475, Oct. **1937. DWB**—Of great importance to the understanding of the large scale weather situation is the question of whether the waves associated with cyclone formation originate on an instability surface of the troposphere or on the tropopause. More basic, however, is the empirical determination of underlying relationships among the four factors, stratospheric pressure gradient, tropospheric temperature gradient, surface air currents and steering. *Subject Headings:* **1. Tropopause waves 2. Stratospheric steering.**—*M.P.K.*

5D–83 551.551:551.510.52/3

Ertel, Hans, **Die Arten der Unstetigkeiten des Windfeldes an der Tropopause.** [The types of instability of the wind field near the tropopause.] *Meteorologische Zeitschrift*, 53(12):450–455, Dec. **1936.** 9 refs., 69 eqs. **DWB**—The author attempts to show theoretically that Bjerknes' and Bergeron's (1933) idea of a tropopause as a Hadamard type of discontinuity surface (that is one with no temperature or wind discontinuity but merely with a discontinuity in *gradient* of temperature and wind) applies only to a tropopause with particles constant. In the more realistic variable particle type of tropopause, that is where the waves are moving through a constantly changing medium, the above Hadamard equations are absurd. *Subject Headings:* **1. Tropopause waves 2. Hadamard discontinuity surfaces. I. Bjerknes, J. II. Bergeron, T.**—*M.R.*

5D–84 551.510.35:536:551.593.652

Jaumotte, J., **Transformations thermodynamiques de la stratosphère et nuages nacrés.** [Thermodynamic transformations of the stratosphere and nacreous clouds.] *Belgium. Institut Royal Météorologique, Mémoires*, v. 5, **1936.** 43+p. 22 figs., tables, refs., 13 eqs. **DWB**—Numerous graphs of temperature soundings (Uccle and a few from other places in Europe) are presented and analyzed synoptically and dynamically to show the cause of the peculiar type of stratospheric structure which they illustrate. In every case the temperature continues to drop after the balloon has risen a few kilometers above a sharp, moderately low tropopause, reaching a minimum at around 18 or 20 km (usually the top of the sounding). The peculiar structure is explained on the grounds of tropical air of the high tropopause (15 to 19 km) moving N in advance of a deep cyclone or trough aloft and being modified considerably by dynamic transformations which naturally occur. Potential temperature/height diagrams help identify the source. Moisture from the tropics is involved and causes nacreous clouds in Arctic when the very cold inversions of tropic air occur. Moisture penetrates even into the stratosphere (i.e. to 24 km.) by diffusion, contrary to the theory of Gold (*Geophysical Mem.*, No. 5) that the tropopause is a "lid" for upward movement of water vapor. Moisture measurements are almost impossible in the stratosphere, except where clouds exist. The present paper is the first to recognize the dual nature of the tropopause in polar and tropical regions and the possibility of their existing simultaneously (superimposed) at the same station. *Subject Headings:* **1. Tropopause dynamics 2. Tropical tropopause 3. Polar tropopause 4. Nacreous clouds.**—*M.R.*

5D–85 551.510.534:551.510.52/1

Meetham, A. R., **Correlation of atmospheric ozone with other geophysical phenomena.** *Royal Meteorological Soc., Quarterly Journal*, v. 62, Suppl.:59–66, **1936.** fig., tables, 6 refs. **DLC**—Ozone amounts are correlated with various elements including height of tropopause (H_c). Corrected correlation coefficient with H_c using European observations was found to be −.67. *Subject Headings:* **1. Atmospheric ozone 2. Tropopause height 3. Europe.**—*C.E.P.B.*

5D–86 551.509.317:551.510.52/1

*Palmén, E., **Zur Frage der Temperatur-, Druck-, und Windverhältnisse in den höheren Teilen einer okkludierten Zyklone.** [Temperature, pressure and wind conditions in the upper part of an occluded cyclone.] *Meteorologische Zeitschrift*, 53(1):17–72, Jan. **1936.** 11 figs., 4 tables, refs. **DWB**—Synoptic aerological study of the deep, occluded cyclone of Feb. 2–3, 1933, using data from simultaneous registering balloon ascents in southern Norway and Belgium. Temperature curve diagrams and tabulated data for Uccle and Ås show tropopause height and temperature while

vertical cross sections indicate relationship between tropopause height and configuration and pressure distribution and fronts. *Subject Headings:* **1. Synoptic aerological studies 2. Occluded cyclones 3. Tropopause height 4. Tropopause temperature 5. Northwest Europe.**—*M.P.K.*

5D–87 551.524.3:551.543:551.587

*Portig, W., **Gleichzeitige Temperatur- und Luftdruckänderungen in der freien Atmosphäre.** [Simultaneous temperature and pressure changes in the upper atmosphere.] *Beiträge zur Physik der freien Atmosphäre,* 23(2):85–94, **1936.** 7 figs., 3 tables, 7 refs. **DLC**—A careful statistical analysis of aerological data from Munich in an attempt to check the Rossby (1927) theory of simultaneous pressure and temperature fluctuations in the free atmosphere. The role of heat and of mass advection are respectively evaluated for each separate km level from 1 to 10 km for each season and for the year. The effects are also related to the tropopause level, showing that at the tropopause the advection of heat is significantly greater than that of mass, but above and below the tropopause the effect of mass transport becomes more important. *Subject Headings:* **1. Pressure-temperature correlations 2. Tropopause correlations 3. Advection of heat 4. Advection of mass.**—*M.R.*

5D–88 551.510.52/3

Portig, W., **Beiträge zur Kenntnis der Tropopause.** [On the knowledge of the tropopause.] *Beiträge zur Physik der freien Atmosphäre,* 23(2):121–128, **1936.** 4 tables, 4 figs., refs., eqs. **DLC**—The statistical and dynamic properties of the tropopause are discussed and illustrated by tables and graphs and a theoretical treatment included to show tentatively the changes which take place during horizontal movements of tropical or equatorial air or fronts. The correlations between temperature and pressure changes and height changes of the tropopause are not close enough to warrant the formulation of any positive rules. However, by making corrections for compensation of pressure, for temperature and pressure near the surface and for 24 hour pressure changes, better correlations are possible. *Subject Headings:* **1. Tropopause dynamics 2. Tropopause-height-pressure-temperature correlations.**—*M.R.*

5D–89 551.524.32

*Reger, Josef, **Der mittlere jährliche Temperaturgang über Lindenberg, nach Registrierballonaufstiegen in den Jahren 1906–1935.** [Average yearly temperature variation over Lindenberg, according to balloon soundings ascents 1906–1935.] *Beiträge zur Physik der freien Atmosphäre,* 23(3):195–198, **1936.** fig., 2 tables. **DLC**—The results of the Lindenberg sounding balloon ascents up to 26 km for 1906–1935 are tabulated by months and compared with those for 1928-35, the latter period containing a greater number of soundings than were obtained from 1906–1927 (394 and 339, respectively). The mean height of the tropopause and its corresponding mean temperature is given for each month. An isopleth diagram shows the vertical temperature gradient from 0–26 km for the year. The annual cycle of tropopause height is not very marked in this revised model; however the sample is still not representative. *Subject Headings:* **1. Tropopause height data 2. Tropopause temperature data 3. Annual temperature variations 4. Lindenberg, Germany.**—*M.R.*

5D–90 551.515.53:778

Stevens, Albert W., **The first photograph ever made showing the division between the troposphere and the stratosphere and also the actual curvature of the earth—photographed from an elevation of 72,395 feet, the highest point ever reached by man.** *National Geographical Magazine,* May **1936.** photo. **DWB**—A detailed separation is visible between the dust-laden, cloudy troposphere and the stratosphere which appears very dark in contrast due to the lack of sunlight-scattering dust. Photo was taken from the balloon Explorer II over S. Dakota, Nov. 11, 1935. *Subject Headings:* **1. Manned balloons 2. Photographs from stratosphere 3. Tropopause.**—*M.P.K.*

1937

5D–91 551.509.317

*§Bjerknes, J. and Palmén, Erik, **Investigations of selected European cyclones by means of serial ascents. Case 4: February 15–17, 1935.** *Geofysiske Publikasjoner,* 12(2), **1937.** 62 p. 44 figs., 15 tables, refs., eqs. **DLC**—The monograph is a report on simultaneous "swarm ascents" of light meteorographs from Uccle, Ås and seventeen cooperating stations. Excellent diagrams, charts, and tables are included. The synoptic situation is described, the tropospheric and stratospheric fields of temperature and the tropopause analyzed, and selected isopleth-diagrams discussed. Special emphasis is given to the multiple tropopause. *Subject Headings:* **1. Synoptic aerological studies 2. Multiple tropopause 3. Northwest Europe.**—*M.P.K.*

5D–92 551.524.7

*Futi, H., **The vertical distribution of temperature in the stratosphere and troposphere over the the earth.** *Meteorological Society of Japan, Tokyo, Journal, 2nd Ser.*, 15(12):30–44, Dec. 1937. 24 figs., tables, refs. In Japanese; English summary p. 51–52. **DWB**—Using recent data from sounding balloon ascents at Ås, Agra, Poona, Madras, Ellendale, Omaha, Dallas and Pretoria, the author has prepared monthly cross section models of atmospheric temperature distribution from 0–30 km which are an improvement over those of BJERKNES et al. (1933, *see* 5D–67 above) for seasons, or of PALMÉN (1934), RAMANATHAN (1929) or SHAW (1927). In fact these come the closest to showing the sharp discontinuity at latitude 23°N (winter) and 32°N (summer) between the tropical and polar tropopause of any models yet prepared. The tropopause is nearly flat from those points to the pole or equator, respectively. In fact it dips slightly toward the equator. The coldest air on earth is a ring near the equator at 17 km (−88°C) surrounded by rings of warmer air and with its center moving from 4°N to 4°S with the seasons. Annual variation in height of tropopause is said to be due to annual variation in average height of ozone layer and resulting stratospheric temperature. *Subject Headings:* **1. Tropopause models 2. Tropopause height 3. Upper air temperature data 4. Ozone.**—*M.R.*

5D–93 551.524.7:551.510.53

Jaumotte, J., **Structure thermique de la stratosphère jusqu'à 30 km.** [Thermal structure of the stratosphere up to 30 km.] *Beiträge zur Geophysik*, 50:403–422, **1937.** 8 figs., 13 refs., eqs. **DWB**—Observations (1933–36) indicate a temperature inversion starting abruptly at a varying altitude, 16–25 km, and in evidence each year from spring till fall. Tropopause height discussed in its relation to the general atmospheric situation, being high over anticyclones of tropical or subtropical origin and low over a troposphere composed of polar air. Temperature gradient above the inversion shown to be between 1° and 2° km with an isothermal tendency above 35 km. Onset of the inversion in spring is related to diffusion, ozone content and electric conductivity of the air. *Subject Headings:* **1. Temperature of the stratosphere 2. Tropopause height 3. Northwest Europe.**—*M.P.K.*

1938

5D–94 551.524.7(98)

*Guterman, I. G., **Temperaturnye usloviia po vertikali nad Zemleĭ Frantsa Iosifa.** [Vertical temperature gradients above Franz Joseph Land.] *Meteorologiia i Gidrologiia*, No. 6:56–65, **1938.** 2 figs., 11 tables. English summary by Robert G. Stone in: *American Meteorological Society, Bulletin* 19(10):433–436, Dec. **1938.** mostly tables. **DWB, DLC**—Data given in tabular and graphic form, average lapse rates, months when extreme seasonal temperatures occur, typical soundings in stable continental and marine Arctic air, average annual temperature and annual range of temperature at standard heights, mean interdiurnal change of temperature by heights and seasons, and mean height and temperature of tropopause for each month, for 93 soundings. Relation of temperature of tropopause to height by seasons and levels (<8 km, 8–9, 9–10 and >10 km) and height and temperature by Schmauss types. *Subject Headings:* **1. Tropopause height 2. Vertical temperature gradient 3. Franz Joseph Land 4. Arctic. I. Stone, Robert G.**—*M.R.*

5D–95 551.506.7(439.1

*Hungary. Meteorológiai és Földmágnességi Intézet, **Aerológiai havi jelentés. Bulletin aérologique de Hongrie. Aerologischer Monatsbericht von Ungarn.** v. 1, No. 1, Jan. **1938**– Mostly tables. Legends in Hungarian, French and German. Monthly (irregular). **DLC**—Besides the data for individual soundings (temperature, humidity and wind) to ca. 19 km made at Budapest and other places in Hungary, monthly means for each geopotential km—level and each pressure surface are tabulated, and the isopleths of temperature shown for each day for heights of 0–19 gdm at Budapest on time-altitude graphs on some of which the tropopause changes from day to day are shown by a wavy heavy black line (18–23 July 1938). *Subject Headings:* **1. Tropopause data 2. Tropopause time cross sections 3. Monthly data bulletins 4. Budapest, Hungary.**—*M.R.*

5D–96 551.551:551.510.52/3:629.1

Mironovitch, V. and Viaut, André, **Turbulence et navigation aérienne dans la substratosphère.** [Turbulence and aerial navigation in the substratosphere.] *L'Aéronautique*, Paris, 20:202–20 Oct. **1938.** 5 figs., tables. **DLC**—Noted by sounding balloon observations that at the beginnin of the stratosphere exists a very agitated layer of transition from the troposphere. Necessity avoiding this region in flight planning emphasized. (*Same item as* 3K–49, Nov. 1952 *MAB*) *Subject Headings:* **1. Clear air turbulence 2. Tropopause turbulence 3. Aeronautical meteorology** —*H.P.K.*

1939

5D–97 551.587(988)

Carmichael, Hugh and Dymond, E. G., **Upper air investigations in North-West Greenland.** *Royal Society of London, Proceedings, Ser. A*, 171(946):345–359, June 6, 1939. 8 figs., table, refs. p. 359. **DLC**—Upper air observations made during the 1937 Wordie Expedition to NW Greenland and the Canadian Archipelago, are summarized and arranged. Pilot balloon observations were made during July–Sept. 1937 to determine winds at time when cosmic ray and temperature soundings were made with large balloons. In addition the big balloons were followed with a theodolite. The tropopause was sharp, with a thin transition layer (about 50 m) and a marked warming in the stratosphere up to 20 km. The wind maximum was found to be about 1.5 km below the tropopause, and varied in height with weather. *Subject Headings:* **1. Upper air winds 2. Polar tropopause 3. Canadian Arctic 4. Northwest Greenland.**—*M.R.*

5D–98 551.511:551.510.52/3

Ertel, Hans, **Singuläre Advektion und Zyklonenbewegung.** [Singular advection and the movement of cyclones.] *Meteorologische Zeitschrift*, 56(11):401–407, Nov. 1939. 4 figs., 36 refs., 50 eqs. **DLC**—The singular advection, according to the author is caused by a singularity of the momentum-density field. The tropopause is such a surface requiring a discontinuity of wind speed. A differential equation for the dynamic topography of the tropopause surface is developed. The translational movement (c) of cyclones depends on the gradient $\frac{\partial \phi_H}{\partial n}$ of this surface

$$c = \frac{\phi_H}{g\lambda} \frac{[\alpha]}{T_H} \left(\frac{p_H}{p_o}\right) \frac{\partial \phi_H}{\partial n};$$

g, T, p—usual symbols; index$_H$ for the tropopause; index$_o$ for the sea level; $[\alpha]$—temperature jump at the tropopause; λ—Coriolis parameter, and $\frac{\partial \phi H}{\partial n}$ is absolute value of the gradient of the dynamic topography of the tropopause. Comparison with a single synoptic case shows a good agreement. *Subject Headings:* **1. Advection 2. Cyclone movement 3. Tropopause theory. I. Rossby, C. G.**—*A.A.*

5D–99 551.515.8:551.510.52/3

Haurwitz, Bernhard, **The interaction between the polar front and the tropopause.** *Royal Society of Canada, Transactions, 3rd Ser., 33* (Sect. 3.):83–105, 1939. 3 figs., 12 refs., 32 eqs. **DWB**—The observed relations between motions, temperature and pressure variations at the tropopause and in the lower atmosphere are interpreted as relations between wave motions in a fluid system with an internal surface of discontinuity separating fluids of different density and velocity. "External" and "internal waves" are differentiated. It is shown how the observed phase differences between the motions in the upper and lower atmosphere must be attributed to internal wave motions. The "convective" and "dynamic" terms in the expression for wave velocity are explained and their applications to polar front waves and tropopause waves indicated. Tropopause waves appear due to polar front waves especially in cases when a state of "resonance" exists between the two. *Subject Headings:* **1. Polar front waves 2. Tropopause waves.**—*From author's abstract.*

5D–100 551.524.7:551.547.3

Haurwitz, B. and Haurwitz, E., **Pressure and temperature variations in the free atmosphere over Boston.** *Harvard Meteorological Studies*, Cambridge, Mass., No. 3, 1939. 74 p. 23 figs., 20 tables, 34 refs., eqs. **DWB**—"Radio soundings made at Boston during Feb. and March 1937 and from Oct. 1937 until June 1938 are used to determine the relations between the pressure and temperature variations in the different layers of the atmosphere. On p. 35 tabulated correlation coefficients for all data show that the correlation between the pressure and the height of the tropopause increases with elevation. At 3 dyn. km the correlation coefficient is +.62, at 5 dyn. km, +.70 and at 9 dyn. km, + .73." Strong correlation exists between tropopause height and mean temperature at 9 dyn. km as shown by a coefficient of +.78 (corresponding value for Europe is + .75). Regression equations expressing the pressure deviations by the deviation of the height of the tropopause from its mean value show that with an increase of the height of the tropopause the pressure at 3 dyn. km rises least and at 9 dyn. km most. "Variations of the pressure and of the height of the tropopause during the passage of isallobaric highs and lows at the earth's surface" are tabulated and represented graphically (p. 43–44) as is also the "coupling between waves at the polar front and at the tropopause" (p. 56). *Subject Headings:* **1. Upper air pressure variations 2. Upper air temperature variations 3. Tropopause 4. Boston, Mass.**—*M.P.K.*

5D–101 551.524.3:551.510.52/3

*Kochanski, Adam, **Sur les variations de la température dans la troposphère et la tropopause.** [Variations of temperature in the troposphere and in the tropopause.] *Lvov. Uniwersytet. Instytut Geofizyki i Meteorologii, Komunikaty*, 19(125):59–71, **1939.** 4 tables, 7 figs., foot-refs. **DWB**—In testing ARCTOWSKI's (1934) hypothesis that departures of temperature at high levels are later reflected, but in opposite direction, at the surface (0–5 km), the author analyzes aerological data for Svesterberg, Holland (1921–35) and Lindenberg, Germany (1906–35) and shows that changes at the tropopause level sometimes work down to the surface and then back to the substratosphere but are always of opposite sign at the tropopause than in the 0–5 km level. *Subject Headings:* **1. Tropopause temperature 2. Stratospheric temperature influences 3. Svesterberg, Holland 4. Lindenberg, Germany.**—*M.R.*

5D–102 551.574.7:551.507.32

Lange, Karl O., **Vereisungsmessungen mit der Harvard-Radiosonde.** [Ice formation measurement with the Harvard radiosonde.] *Beiträge zur Physik der freien Atmosphäre*, 25(4):241–250, **1939.** 6 figs., 9 refs. In German, English summary p. 249–250. **DLC**—The tropopause is shown on a sample record (2–22–37). The Harvard (Lange) radiosonde is described and illustrated and 2 instances of icing given. Regular radiosonde observations were begun in America in Dec. 1936 using the Lange instrument. Icing was at times so severe as to affect the ascension rate of the balloons—sometimes even forcing the balloon to descend several thousand feet before ice melted. A weight of 1 kg of ice was calculated from change in rate of ascent. Humidity of $< 100\%$ is claimed to be a necessary condition for such icing. *Subject Headings:* **1. Tropopause 2. Icing of radiosonde balloons 3. Experimental radiosondes 4. Lange radiosonde (Harvard radiosonde) 5. Blue Hill Observatory, Mass.**—*M.R.*

5D–103 551.51

*Mironovitch, V. and Viaut, A., **Sur quelques points de la structure verticale de l'atmosphère libre résultant de radiosondages récents.** [Certain points on the vertical structure of the free atmosphere resulting from recent radiosonde ascents.] *La Météorologie*, p. 99–112, March/April **1939.** 10 figs., tables. **DWB**—A study of the atmosphere up to ca. 20 km over Paris using 1937 and 1938 data from the ship "Carimare" of the Office National Météorologique. Discussions of the reversal of the isobaric field with altitude, structure of cold air invasions, turbulence, "retrograde" fronts and splitting of the tropopause (p. 108) are well illustrated with charts, soundings and schematic diagrams. *Subject Headings:* **1. Multiple tropopause 2. Temperature profiles 3. Cross sections 4. Paris, France.**—*M.P.K.*

5D–104 551.587(51

*Tu, Chang-wang, **Results of aerological investigations in China.** *Beiträge zur Physik der freien Atmosphäre*, 25(4):233–240, **1939.** 4 figs., 7 tables, 2 refs. **DLC**—Complete analysis of data from 5 years of 132 airplane soundings up to 5 km at Nanking (1932–3) and 74 kite ascents at Peiping (1932–4) to 2500 m. Balloon soundings were carried out on International Days at Nanking during 1936–8, but only 10 good soundings were obtained. Results show heights of tropopause from 11 to 18 km with average 15 km, and temperature $-55°$ to $-76°$C, average $-65°$C, and at 22 km $-55°$C. *Subject Headings:* **1. Tropopause data 2. Upper air data 3. Nanking, China.**—*M.R.*

5D–105 551.509.317:551.510.52

§*Van Mieghem, Jacques, **Sur l'existence de l'air tropical froid et de l'effect de foehn dans l'atmosphère libre.** [On the existence of cold tropical air and of foehn effect in the free atmosphere.] *Belgium. Institut Royal Météorologique, Mémoires*, No. 12, **1939.** 32 p. fold. figs. fold. tables, refs. append. p. 25–32. **DWB**—In this monograph the author makes a detailed and elaborate synoptic aerological study (of the PALMÉN type) of two cold front situations over western Europe (Feb. 1–4, 1933 and Feb. 16–17, 1935). Serial soundings of temperature to 20 km are reproduced and comparative soundings show areas of warming or subsidence. The sudden changes of the tropopause are evident from the data for Feb. 2 when a drop from 10.6 km to 9.9 km occurred in 3 hours. Soundings at Uccle and Trappes indicated a foliated type of tropopause, with a new higher tropopause forming above the upper trough just at the time of the passage of the cold front, as is often the case. The dynamic changes are illustrated by the time cross sections. *Subject Headings:* **1. Synoptic aerological studies 2. Free air föhn 3. Multiple tropopause 4. Tropopause drops 5. Cold front effects**—*M.R.*

1940

5D–106 551.510.52

*Bilancini, R., **Sull'altezza della tropopausa a Vigni di Valle e sulla sua relazione con la temperatura della media troposfera.** [On the height of the tropopause at Vigni di Valle and relation

to the mean temperature of the troposphere.] *Rivista di Meteorologia Aeronautica*, Rome, 4(4):3–15, Oct./Dec., **1940.** 7 figs., 22 refs., 9 tables, eqs. **DLC**—Data obtained from 248 balloon soundings at Vigna di Valle (42°N, 12°E, 272 m), the most southerly European air station, from 1926–1937 are analyzed to show the annual variation in height of tropopause (9.4 to 12.5 km), and these values are compared with those at other European aerological stations to show that the annual range is greater (3.1 km.) than at any of the other stations. The height of tropopause is correlated with temperature of each km level and a strong positive relation shown for levels between 8 and 15 km. Use in forecasting is suggested. *Subject Headings:* **1. Tropopause height data 2. Tropopause height variations 3. Tropopause correlations 4. Vigni di Valle, Italy.**—*M.R.*

5D–107 551.510.52/3

Byers, H. R. and others, **Six months of daily observations of multiple tropopauses over the United States.** *I.U.G.G. Association of Meteorology, Septième Assemblée Générale, Washington, Sept. 1939, Procès-Verbaux des Séances*, II, *Mémoires et Discussions*, p. 50–51, **1940. DWB**—As suggested by BJERKNES and PALMÉN "multiple tropopauses" observed in the U. S. for six months are classified according to 10° ranges of potential temperature from 290°A to 399°A. Mean altitude and temperature tabulated for each 10° category and the weighted means over the entire temperature range obtained. A few individual cases showing multiple tropopauses over the U. S. are presented and a discussion of their bearing on weather given. Some extreme values mentioned. Short discussion by G. D. LUKAS, C. HARMANTAS and C. CHAPMAN on effect of instrumental errors and value of ozone measurements in upper air study. *Subject Headings:* **1. Multiple tropopause 2. United States.**—*From author's abstract.*

5D–108 551.510.53:551.557

†Ekhart, E., **Zur Kenntnis der Windverhältnisse in der oberen Stratosphäre.** [On knowledge of wind conditions in the upper stratosphere.] Berlin, Reichsamt für Wetterdienst, **1940.** 50 p. 13 figs., 14 tables, bibliog. p. 41–43. **DWB**—Good review of the various techniques of upper air wind observations, their reliability and limitations. Examples of data obtained by each method and references to outstanding literature given. Region of maximum zonal winds occurs below the tropopause at 20°N in Feb. and at the tropopause near 40°N in Aug. (*Same item* as 4F–20, June 1953, *MAB.*) *Subject Headings:* **1. Upper air wind measurement 2. Stratospheric winds 3. Tropopause-wind relationships.**—*M.P.K.*

5D–109 551.511

Humphreys, William Jackson, **Physics of the air.** 3rd ed. New York, McGraw-Hill Book, Inc., **1940.** 676 p. 226 figs., tables, refs., eqs. **DLC**—Included in Chap. 3 on "Observed vertical temperature gradients" (p. 43–50) and in Chap. 4 on "The isothermal region or stratosphere" (p. 51–66) are descriptive accounts of the tropopause and its origin with comments on the seasonal and latitudinal variations of tropopause height and temperature. *Subject Headings:* **1. Physics of the atmosphere 2. Textbooks 3. Tropopause.**—*M.P.K.*

5D–110 551.510.52/3:551.515.11

†§Küttner, Joachim, **Die Rolle der Tropopause bei der Zyklogenese.** [The role of the tropopause in cyclogenesis.] *Beiträge zur Physik der freien Atmosphäre*, 26(3):152–196, **1940.** 30 figs., 55 refs., 14 eqs. **DWB**—The depression of the tropopause above a surface obstruction (or rising air current) and lifting in the lee are explained as evidence of a wave effect ("flutwellen" effect) in the upper air like that observed under similar conditions in water. All requirements for cyclogenesis are satisfied by the phenomena. Mention is made of the theories of RODEWALD, PALMÉN, and SCHERHAG. *Subject Headings:* **1. Upper air analysis 2. Cyclogenesis 3. Tropopause waves.**—*M.P.K.*

5D–111 551.511:551.510.53:551.543

*†§Lucht, F., **Der Anteil der Stratosphäre an den Luftdruckschwankungen am Erdboden auf Grund der Theorie der singulären Advection erster Ordnung.** [Participation of the stratosphere in the air pressure oscillations at the surface on the basis of the theory of singular advection of the first order.] *Berlin. Universität. Meteorologisches Institut, Veröffentlichungen*, 4(1), **1940.** 62 p. 61 figs., tables, 44 refs. **DLC**—The tropopause is considered (after ERTEL) as a discontinuity surface of the first order. The theory of singular advection of the first order is elaborated and shown to lead to the conclusion that the direction of movement of cyclones and anticyclones is determined by the dynamic topography of the tropopause and is normal to the gradient of the tropopause surface with the highest tropopause on the right. The speed of propagation can be calculated by using an equation which takes into account the height, slope, temperature and pressure at the tropopause and surface pressure. Most of the study consists of a synoptic and dynamic analysis of a dozen cases of ordinary and retrograde movement of cyclones and anticyclone steering.

Subject Headings: **1. Tropopause steering 2. Stratospheric steering 3. Pressure variations 4. Synoptic studies. I. Ertel, Hans.**—*M.R.*

1941

5D–112 551.510.52/3

*Cagniard, Louis, **Sur la pente de la tropopause et ses variations.** [The slope of the tropopause and its variations.] *Académie des Sciences, Paris, Comptes Rendus*, 213:34–37, **1941.** refs. **DLC**—Calculations of the instantaneous slope of the tropopause surface, made from available published aerological soundings, while not too accurate because of the sparsity of data, are very simple to make and if they show a straight line correlation with atmospheric disturbances should be useful in forecasting. Calculations can be made from: a) one station by using successive soundings, or b) from 3 adjacent stations having synoptic soundings. If the first method is used the wind must be considered. The mean slope z/x is calculated to be 1.6×10^{-3} for the latitude of France. Individual slopes (14 and 15 July 1924 at Bar-le-Duc, France) varied from 1.84 to 3.42×10^{-3} in 24 hours during a period of marked tropopause waves. Slopes are compared with temperature and wind gradients at those times and with the average conditions. *Subject Headings:* **1. Tropopause slope 2. Tropopause waves 3. Bar-le-Duc, France.**—*M.R.*

5D–113 551.510.52/3

Eredia, Filippo, **Le variazioni di altezza della tropopausa.** [Variations of the altitude of tropopause.] *Scientia*, Milan, 70:9–12, **1941. DLC**—Brief discussion of some factors determining tropopause height including atmospheric disturbances, barometric pressure, latitude, etc. Tropopause considered not as a continuous and impermeable separation between troposphere and stratosphere but rather as a zone of separation between the air masses predominating at the surface and aloft. Knowledge of tropopause height considered of value in forecasting the movement of tropospheric disturbances. *Subject Heading:* **1. Tropopause height.**—*M.P.K.*

5D–114 551.515.53

†Haurwitz, Bernard, **Physical state of the upper atmosphere.** Toronto, Royal Astronomical Society of Canada, Oct. **1941.** 96 p. 30 figs., 11 tables, 121 refs., eqs. Reprinted from: *Journal of the Royal Astronomical Society of Canada*, Oct. 1936–Feb. 1937, with addition Oct. 1941. Reprint of first ed. Feb. 1937, with additional chapter of supplementary notes, 2 tables, and refs. p. 122–140. Review in *American Meteorological Society, Bulletin*, 21(9):356, Nov. **1940. DLC**—On p. 4 is given the cross section of the atmosphere from 0–29 km and 0–90° latitude for summer and winter showing the classical continuous tropopause. Discussion mentions the fact that earlier theories of the formation of stratosphere must be discarded since discovery of effect of ozone in heating high layers of air (see p. 67). *Subject Headings:* **1. Tropopause 2. Meridional cross sections 3. Stratosphere.**—*M.R.*

5D–115 551.576.11:551.557:629.13

Horrocks, H., **Notes on the upper air ascents at Boscombe Down and the upper winds at Larkhill and Liverpool.** *Great Britain. Aeroplane and Armanent Experimental Establishment, Boscombe Down, High Altitude Development, Flight Report* No. 16, Oct. **1941.** 20+p. 19 figs., 15 tables. **NJP**—Report of 69 special ascents to 40,000 ft at Boscombe Down. All trails were due to condensation of exhaust water. Persistent trails were not formed more than 1500 ft above the tropopause. Evasive action discussed. Information included on strong upper winds and changes of wind with height, time and distance. There are close-up photos of trails. (For fuller abstract *see item* 2I–74, Sept. 1951, *MAB.*) *Subject Headings:* **1. Condensation trails 2. Exhaust trails 3. Upper air winds 4. Tropopause 5. England.**—*C.E.P.B.*

5D–116 551.515.13:551.510.52/1

Lucht, Fritz, **Der Anteil der Stratosphäre an der Steuerung der Zyklonen und Antizyklonen auf Grund der Theorie der singulären Advektion erster Ordnung.** [The influence of the stratosphere on the steering of cyclones and anticyclones on the grounds of the theory of singular advection of the first order.] *Meteorologische Zeitschrift*, 58(1):11–23, Jan. **1941.** 25 figs., tables, 9 refs. Summary p. 11. Trans.: *U. S. Weather Service Report* No. 703, 1944. **DWB**—Through the use of ERTEL's theory of singular advection of the first order, some examples of cyclone and anticyclone movement were investigated. In all cases for cyclones and anticyclones it was found that tropopause topography could be used to predict flow direction. Calculations of velocity yielded acceptable results for cyclones and active anticyclones. *Subject Headings:* **1. Tropopause 2. Stratospheric steering.**—*M.P.K.*

5D–117 551.521:551.510.52/1

Möller, F., **Die Wärmestrahlung des Wasserdampfes in der Atmosphäre.** [The heat radiation of water vapor in the atmosphere.] *Beiträge zur Geophysik*, 58(1/2):11–61, **1941.** 9 figs., 7 tables

57 eqs., ref. **DLC**—A fundamental contribution to quantitative knowledge of the radiation balance and structure of the atmosphere. The importance of grey body radiation (ca. 10μ) from the upper boundary of haze layers is shown. This occurs in one of the gaps in the water vapor absorption spectrum. The author shows among other things, that a sharply defined tropopause would be impossible were it not for this haze boundary and the radiation therefrom (tropopause sharpening through haze radiation p. 49–51.) The role of water vapor and haze in other layers and boundaries (i.e. inversions) is thoroughly treated. *Subject Headings:* **1. Tropopause theory 2. Radiation balance 3. Haze boundaries.**—*M.R.*

5D–118 551.511:551.543:551.524.3

*Penner, C. M., **The effects of tropospheric and stratospheric advection on pressure and temperature variations.** *Canadian Journal of Research Sec. A*, 19(1):1–20, Jan. **1941.** 12 figs., 5 tables, eqs. **DLC**—In a study of 1938–39 pressure and temperature variations up to 20 km at Sault Ste. Marie, mean values of tropopause height and temperature for all data are tabulated (p. 3) and variation of the pressure and of the height of the tropopause with the passage of surface highs and lows is presented in graphic form (p. 3, 15). Tropopause height variations are also shown on vertical cross sections of temperature and reduced pressure anomalies associated with the passage of surface highs and lows (p. 8–9). *Subject Headings:* **1. Pressure variations 2. Temperature variations 3. Tropopause height 4. Sault Ste. Marie, Mich.**—*M.P.K.*

5D–119 551.510.52/3(4)

*Wegener, Kurt, **Die Tropopause in Europa.** [The tropopause in Europe.] *Annalen der Hydrographie und Maritimen Meteorologie*, 69(4):113–117, April **1941.** 3 tables, 2 refs. **DLC**—The variations in the mean height of the tropopause in summer and winter, in northern and southern latitudes, in the interior of the continent and over the western oceanic portions, and during cyclonic and anticyclonic conditions, respectively, are shown in illustrative tables and an attempt made to explain the apparent anomalies which disagree with the theory of warm low and cold high tropopause over deep cyclones and anticyclones, respectively. *Subject Headings:* **1. Tropopause height 2. Tropopause temperature 3. Europe.**—*M.R.*

1942

5D–120 551.510.52/3

Béll, Béla, **A sztratoszféra alsó határának változásai.** [Variations of the lower boundary of the stratosphere.] *Időjárás*, 46(3/4):76–86, March/April **1942.** 4 figs. German summary p. 105–106. **DLC**—A report on the serial ascents made at Budapest (during a cyclone) from 12 to 16 Feb. 1935, and analysed for all of Europe by Bjerknes and Palmén (*Geofysiske Publikasjoner*, 12(2), 1935). The different types of tropopause in different air masses are well illustrated. The troposphere warming on Feb. 16, on the front of a strongly developed cyclone, combined with cooling in the lower stratosphere, resulted in formation of a new and higher tropopause, which was evident at first by a isolation or multiple tropopause. Potential temperature chart shows wave in lower stratosphere accompanying cyclone passage, but extending only to 14 km. *Subject Headings:* **1. Tropopause height 2. Cyclone structure 3. Budapest, Hungary.**—*M.R.*

5D–121 551.510.52/3:551.513(02)

†Court, Arnold, **Tropopause disappearance during the Antarctic winter.** *American Meteorological Society, Bulletin*, 23(5):220–238, May **1942.** 10 figs., 36 refs. **DLC**—A "classic" and often quoted article on the relation of tropopause height to general circulation in the Southern Hemisphere, especially the Antarctic, in comparison with the Arctic tropopause and circulation. The analysis is based on 190 radiosonde ascents made from April 24, 1940 to Jan. 15, 1941 by U. S. Weather Bureau personnel attached to the U. S. Antarctic Expedition of 1939–41, at Little Old America III, 700 miles from the South Pole. Complete data published in *Monthly Weather Review, Suppl.* 48. (*See item* 2–160, Feb. 1950, *MAB.*) No previous ascents had reached over 7 km. Individual and mean soundings at Little America are compared graphically with those at Arctic stations such as Barrow, Spitsbergen, Greenland, and N. Siberia for the same season (6 months difference). On the average the tropopause in the Antarctic is about 1 km lower than in the Arctic. Monthly means at Barrow, Fairbanks and Billings, Mont., show more annual variation in troposphere, whereas Antarctic data show the reverse: in the stratosphere a 35°C difference between summer and winter at 15 km and only 12°C in the troposphere. A flight on Dec. 22, 1940 at Little America reached 24 km with a temperature of −30°C. *Subject Headings:* **1. Tropopause height 2. Antarctic tropopause 3. Tropopause disappearance 4. Meridional exchange 5. Little Old America III, Antarctica.**—*M.R.*

5D–122 551.510.5

Flohn, H. and Penndorf, R., **Die Stockwerke der Atmosphäre.** [The layers of the atmosphere.] *Meteorologische Zeitschrift*, 59(1):1–7, Jan. **1942.** fig., table, 17 refs. **DLC**—One of the first of the

many recent attempts to define the layers of the atmosphere and to present a model based on th limits as well as the average conditions of temperature, height, etc. which prevail. The inne atmosphere (0–800 km) is divided into troposphere, stratosphere and ionosphere, and the oute atmosphere (>800 km) is called the "Dissipationssphäre" (dissipation layer). The upper of th 3 layers of the troposphere is called the "Tropopause layer" (8–12 km) and the lower stratospher (12–35 km) the Isothermal layer—a layer of small turbulence but of some mixing. The variou types of tropopause are discussed and tropopause characteristics outlined in detail, with speci attention to statistical difficulties. *Subject Headings:* **1. Tropopause 2. Atmospheric structur 3. Atmospheric models 4. Terminology.**—*M.R.*

5D–123 551.547.3(234.3) 551.524.7(234.3

John, J. F., **Der Einfluss der Alpen auf die interdiurne Druck- und Temperaturveränderlichke der freien Atmosphäre.** [The influence of the Alps on the interdiurnal pressure and temperatu changes in the free atmosphere.] *Meteorologische Zeitschrift*, 59:286–292, **1942.** 6 figs., 6 table 5 refs. **DWB**—The passage of air masses over the Alps leads to changes in the height of the tropo pause, raising it on the windward side and depressing it to leeward. As the prevailing wind west, the height over Pavia is lower and more variable than at Munich, and the interdiurnal pressu and temperature changes are different. (*Same item as* 2K–238, Nov. 1951, *MAB.*) *Subject Hea ings:* **1. Mountain meteorology 2. Tropopause height 3. Interdiurnal temperature variation 4. Interdiurnal pressure variations 5. Alps.**—*C.E.P.B.*

5D–124 551.5(0

Shaw, Sir Wilhelm Napier, **Manual of meteorology. Vol. II, Comparative meteorology. Vo III, The physical processes of weather.** Cambridge, Univ. Press, **1942.** 2nd ed. v. 2, 472 225 figs., tables, refs. v. 3, 445 p. 149 figs., tables, refs. **DWB**—Page 116 of v. 2 and p. 252–3 v. 3 contain the first graphical presentations in meteorological literature of worldwide tropopaus Also in v. 2 is found discussion of tropopause correlation with other elements (p. 334), mean values i cyclones and anticyclones (p. 118–9) and over the Atlantic (p. 98–9), seasonal (p. 114, 419–20) an latitudinal variation (p. 108–9). In v. 3, further discussion includes reference to the tropopaus as the limit of convection (p. 313, 315), to the control of tropopause height by pressure at 9 k (p. 315), to the correlation of tropopause pressure and height with ozone (p. 186), to the relatio between tropopause temperature and height (p. 289) and to height variations (p. 314–5). *Subje Headings:* **1. Tropopause height 2. Tropopause temperature 3. Textbooks.**—*M.P.K.*

1943

5D–125 551.524.7(9

*Penndorf, Rudolf, **Die mittleren Temperaturverhältnisse der freien Atmosphäre am Rand des antarktischen Kontinents.** [Average conditions of the temperature in the free atmosphere o the edge of the Antarctic continent.] *Meteorologische Zeitschrift*, 60(6):201–204, June **1943.** 2 figs 2 tables, 5 refs. **DLC**—Aerological data for Little America (1928/30 and 1933/35) are compare with those of Barkow (Deutsche Antarktische Expedition 1911/12) and Simpson (British Antarct Expedition 1910/13) for the lower layers (4 km) of the atmosphere over the Antarctica; thermois pleths, monthly mean soundings, etc. as well as tabular data on lapse rates are analyzed. From pil balloon observations which show wind speed maximum at 7.5 or 7.7 km it is expected that the tropo pause would be 7–8 km just as in the Arctic (Sverdrup on the Maud gave 8.0 km). In summer th wind speed maximum was 1.1 km higher than in winter. *Subject Headings:* **1. Tropopause heigh 2. Atmospheric structure 3. Upper air temperatures 4. Antarctic tropopause 5. Antarctica.**—*M.*

1944

5D–126 551.515.3 551.5

Doporto, Mariano, **Cell motion in the atmosphere.** *Eire. Meteorological Service, Technic Note*, No. 6, **1944.** 57 p. 8 figs., 7 tables, bibliog. p. 50–51, 64 eqs. **DWB**—Author claims tha the cell motion solution for the atmosphere is the only solution in agreement with the observation facts regarding tropopause waves. In this study he considers "some cases of cell wave motion in single layer atmosphere and the simplest case in a two layer atmosphere" as well as the "modificatio that must be introduced in the solutions to take into account" actual atmospheric complexitie Tropopause height, height variation and waves discussed in their relationship to the upper boundari of the first cell of the tropospheric air and the first and second cells of the stratospheric air. *Subje Headings:* **1. Cell motion 2. Tropopause height 3. Tropopause waves.**—*M.P.K.*

5D–127 551.587:629.

U. S. Air Weather Service, **Meteorological aspects of high altitude flight. (Annex "A" to AA Board Project (M-1) 38.)** *U. S. Air Weather Service, Technical Report* No. 105–31, **1944.** (Former

Report No. 847.) 28 p. 8 figs. **DWB**—A generalized account of upper air meteorological conditions as they influence high level flight (20,000–60,000 ft). Discussion and illustrations include average change with height of significant atmospheric elements, cross sections of average temperature and cloud conditions, winds aloft (turbulence) and miscellaneous phenomena including radiation, ozone, optics, contrails and atmospheric electricity. *Subject Headings:* **1. Tropopause 2. Upper air climatology 3. Cross sections 4. Aeronautical meteorology.**—*M.P.K.*

1945

5D–128 551.587(73)(798)

*Ratner, Benjamin, **Upper air average values of temperature, pressure, and relative humidity over the United States and Alaska.** Wash., D. C., U. S. Weather Bureau, May **1945.** 104 p. Almost entirely tables, charts. **DWB**—Radiosonde data are tabulated for all months for all standard levels (up to ca. 20 km), and temperature-height graphs included (from which average tropopause height is discernible) for Jan., April, July and Oct. Charts depict the temperature and pressure distribution patterns for those same months for 1.5, 3, 5, 10, 13 and 16 km. Data are presented for 37 stations (1938–1943). *Subject Headings:* **1. Tropopause height data 2. Radiosonde data 3. Upper air data 4. United States 5. Alaska.**—*From author's introduction.*

1946

5D–129 551.510.53

Dobson, G. M. B.; Brewer, A. W. and Cwilong, B. M., **Meteorology of the lower stratosphere.** *Royal Society of London, Proceedings, Ser. A,* 185(1001):144–175, Feb. 12, **1946.** 18 figs., 15 refs. **DLC**—In this monumental work on the water vapor, ozone and CO_2 in the upper atmosphere, their influence on radiation balance and hence on temperature and height of tropopause, etc., the authors present numerous charts and graphs to show the quantitative relationships of the elements with height, time and synoptic conditions. Many individual soundings are shown as well as mean conditions over England. The relative importance of the various gases are considered, and, finally, the three questions posed by SIMPSON (1928) regarding the tropopause are tentatively answered on the basis of ratio of H_2O = vapor to O_3 and turbulent mixing. *Subject Headings:* **1. Stratospheric composition 2. Radiation balance 3. Tropopause height 4. Tropopause temperature 5. Ozone.**—*M.R.*

5D–130 551.510.52/3

Mironovitch, V., **Sur l'abaissement anormalement fort de la tropopause.** [Abnormally severe drop of the tropopause.] *La Météorologie,* 22:214–219, **1946.** 2 figs., table, refs. **DWB**—Author attributes an abnormally severe drop (6 km) of the tropopause (*see* 5D–59 above) to sudden cooling of the upper troposphere and a violent turbulent mixing of the adjacent layers of the troposphere and stratosphere associated with strong upper air winds. *Subject Headings:* **1. Tropopause drops 2. France.**—*M.P.K.*

5D–131 551.510.52/3(99)

Mironovich, V., **Sur la disparition de la tropopause constatée en hiver sur le continent Antarctique, et l'explication probable de ce phénomène.** [Disappearance of the tropopause observed in winter over the Antarctic, and its likely explanation.] *La Météorologie,* p. 69–76, Jan./March **1946.** 2 figs. **DWB**—Average of 9 winter soundings at Little America, 1940–1941, (78°21'S, 164°55'W), show no trace of a tropopause in winter but a well defined tropopause at other seasons. Graphic comparison made with winter soundings in Siberia and Alaska (which show tropopause) and near Paris (which show no distinct tropopause). Author then reviews the American explanation of the stratosphere and summarizes a few reasons for disappearance of the tropopause. He feels however that the evidence is too limited to support A. COURT's (*see* 5D–120 above) theory of the consistent winter disappearance of the tropopause in the Antarctica. *Subject Headings:* **1. Tropopause disappearance 2. Antarctic tropopause 3. Little America, Antarctica.**—*M.P.K.*

5D–132 551.524.7(61)

Ourcival, M., **Marche annuelle de la température dans l'atmosphère libre, en France et en Afrique du Nord.** [Annual march of free air temperature over France and N. Africa.] *La Météorologie,* p. 229–236, April/June **1946.** 6 figs. **DWB**—Cross sections show tropopause height and average yearly isopleths of temperature in the free atmosphere up to ca. 19 km over Saint Cyr (Jan. 1938–April 1940) and Limoges, Marignane, Blida (Algiers), and Rabat (Morocco) (all Jan. 1941–Oct. 1942). Maximum tropopause height observed in summer and minimum in winter. Secondary maximum observed in spring over Limoges, Marignane, Blida and Rabat. *Subject Headings:* **1. Tropopause height 2. Temperature variations 3. France 4. North Africa.**—*M.P.K.*

5D–133 551.510.52/3(42

*Priestley, C. H. B., **Characteristics of the tropopause over Southern England, 1944.** *Great Britain. Meteorological Office. Synoptic Div., Technical Memorandum*, No. 107, **1946.** 14 p. 4 figs., 10 tables, eqs., append. p. 14. **DWB**—A year of radiosonde data obtained at Larkhill analyzed statistically along the lines of DINES' classical study (*Geophysical Memoirs*, No. 13). By removing the annual temperature cycle, higher correlation coefficients were obtained between air mass temperature and height or temperature of tropopause. Monthly seasonal and annual means of height, temperature, pressure of tropopause and 500 mb and surface pressure and temperature are also presented in graphs and tables and discussed. Larkhill data are compared graphically with those for Lerwick (Scotland). A direct relationship is found between pressure and temperature of tropopause at all seasons and all stations, though the relationship varies with height. *Subject Headings:* **1. Tropopause data 2. Tropopause correlations 3. Larkhill, England.**—*M.R.*

1947

5D–134 551.510.52/

Dewar, D. and Sawyer, J. S., **Seasonal charts of the mean height of the tropopause.** *Great Britain. Meteorological Research Committee, MRP* 334, March 12, **1947.** (unpub.) 4 p. 10 refs. 4 charts. **DWB**—From British and U. S. radiosonde data and isolated worldwide observations (weighted by reliability), quarterly charts (Mercator projection) are constructed which show contours of mean height of tropopause in thousands of feet in various belts of latitude. *Subject Headings:* **1. Tropopause height.**—*M.P.K.*

5D–135 551.510.52/3(0

Flohn, H., **Die mittlere Höhenlage der Tropopause über der Nordhalbkugel.** [Average height of the tropopause over the Northern Hemisphere.] *Meteorologische Rundschau*, 1(1/2):26–2 July/Aug. **1947.** 4 figs., 2 tables, 8 refs. **DWB**—Circumpolar maps show tropopause height the Northern Hemisphere for summer and winter when the monsoon influence is prevalent. Tropopause comparatively low in cold areas, high in warm areas. Meridional cross sections show that winter the slope of the tropopause is steeper and the maximum occurs in more southerly latitude than in summer. The slope of the tropopause in summer in the Southern Hemisphere is even steeper (than that of the Northern Hemisphere in winter). During the summer the temperature of the tropopause increases steadily from equator to the pole while in winter a maximum tropopause temperature occurs in the middle latitudes. *Subject Headings:* **1. Tropopause temperature 2. Tropopause height 3. Meridional cross sections 4. Northern Hemisphere.**—*Author's abstract.*

5D–136 551.510.53:551.543

Flohn, Hermann, **Stratosphärische Wellenvorgänge als Ursache der Witterungssingularitäten.** [Stratospheric wave occurrence as a cause of weather singularities.] *Experientia*, Basel, 3(8):31 322, **1947.** refs. English summary p. 322. **DLC**—The "collective" (various periods) pressure waves are single rational divisors of the year. The singularities will be understood as higher harmonic oscillations of the annual period, partly located in the high stratosphere. Maximum of amplitude of an important wave (30.5 day period) found above 20 km; that of waves with a 15 (or 18) day period found near the tropopause. *Subject Headings:* **1. Stratospheric pressure 2. Pressure waves 3. Tropopause waves 4. Weather singularities.**—*M.P.K.*

5D–137 551.510.52/3(93

*Kerr, I. S., **Mean values of heights of tropopause, 300, 500 and 700 millibar surface at Auckland, Hokitika, and Taieri.** *New Zealand. Meteorological Office, Circular Note*, No. 43, **1947.** 2 p. figs. tables. **DWB**—Monthly means of tropopause height tabulated (in geodynamic meters and conventional feet) and plotted graphically from radiosonde data for Auckland, Hokitika and Taieri (inclusive dates May 1943–April 1947). Mean tropopause height values (1) appear slightly lower than figures for corresponding latitudes in the Northern Hemisphere, (2) show an annual variation in close agreement with Europe and (3) illustrate the downward slope of the tropopause toward the pole. Possible reversal of the slope in winter indicated. (*Same item as* 4D–175, April 1953, *MAB*) *Subject Headings:* **1. Tropopause height data 2. Tropopause slope 3. New Zealand.**—*M.P.K.*

5D–138 551.510.52

Queney, Paul, **Théorie de certaines ondes courtes de la tropopause.** [Theory of certain short waves in the tropopause.] *Académie de Sciences, Paris, Comptes Rendus*, 225(25):1351–1353, De **1947.** eqs. **DLC**—A simple theoretical development on the basis of the hydrostatic equation, the wind profile, density, etc. The assumptions are: 1) that the waves are stable, 2) that they are propagated by a discontinuity in γ/s on the tropopause where the departure $U_o - c$ is proportional to the wave length and not the square of the wave length as in Rossby waves; 3) that waves ha

maximum amplitude near the tropopause; 4) that the local temperature change is in phase with δp in the troposphere and out of phase in the stratosphere, etc. Numerical values are substituted in the equation to serve as an example. *Subject Heading:* **1. Tropopause waves.**—*M.R.*

1948

5D–139 551.551:551.510.52/3

Bannon, J. K., **Meteorological factors in the occurrence of turbulence at high altitudes: interim report.** *Great Britain. Meteorological Research Committee, M.R.P.*, No. 436, Oct. 1, **1948.** 12 p. 6 figs., 9 tables+3 fold., 7 refs., eqs. **DWB**—Tabulated data from BEA and from the British High Altitude Gust Investigation are studied and analyzed. The frequent occurrence of bumpiness near the tropopause is mentioned and the relation of high altitude turbulence to strong wind shear in the horizontal stressed. Regions of such strong horizontal shear above 20,000 ft are indicated on a weather map. (*Same item as* 3K–103, Nov. 1952, *MAB.*) *Subject Headings:* **1. Clear air turbulence 2. Horizontal wind shear 3. Tropopause turbulence.**—*M.P.K.*

5D–140 551.524.7(7)

Ekhart, E., **Neue Beiträge zum Aeroklima Nordamerikas.** [New contribution to the aeroclimatology of North America.] *Geofisica Pura e Applicata*, 7(5/6):210–253, **1948.** 14 figs., 5 tables, 27 refs. German and English summaries. **DLC**—Further study, based on earlier records and studies from kite and APOB soundings, using radiosonde records up to the war. Includes consideration of mean temperatures at various altitudes by latitudes, longitudes, anomalies of pressure affecting inter-hemispherical circulation, correlations between troposphere and stratosphere temperatures and height of tropopause with its temperature. (*Same item as* 4–84, April 1950, *MAB.*) *Subject Headings:* **1. Upper air temperatures 2. Tropopause height 3. North America.**—*M.R.*

5D–141 551.510.52/3 551.510.534

Gherzi, Ernesto, **Pulse reflections from the tropopause and ozone layers (10 to 30 km).** *American Meteorological Society, Bulletin*, 29(3):136–38, March **1948.** fig., ref. **DLC**—Account of strong but variable echoes at Shanghai from three distinct layers (10–13 km, ca. 15 km, and 25–30 km) suggestive of three ozone layers. Variation and splitting of the echoes with air mass type briefly mentioned. *Subject Headings:* **1. Radar echoes from tropopause 2. Radar echoes from ozone layers 3. Radar meteorology 4. Shanghai, China.**—*M.P.K.*

5D–142 551.511

Isimaru, Yukiti, **The mechanism of the earth's atmosphere.** (First communication.) *Fukuoka, Japan. Meteorological Observatory, Memoirs*, 2(5):1–38, Oct. **1948.** 7 figs., 20 tables, refs., 75 eqs. Abstracted from reprint. **MH-BH**—Author first states that the tropopause is an ellipsoid of revolution of the atmosphere due to temperature difference equator−pole. Tropopause is the level of balance between gravitation and centrifugal force. A number of theorems about height and temperature relations of the tropopause are set out. Pt. 3 analyzes seasonal variation of surface temperature including effect of land and sea distribution. (*Same item as* 2.6–46, June 1951, *MAB.*) *Subject Headings:* **1. Tropopause theory 2. Mechanics of the atmosphere.**—*C.E.P.B.*

5D–143 551.557:551.510.52/3

Itami, T.; Enomoto, T. and Koizumi, K., **On the abnormal phenomenon of upper wind in vicinity of tropopause.** *Tateno, Japan. Aerological Observatory, Journal*, 4(2):59–64, Feb. **1948.** 5 figs. In Japanese; English summary p. 59. **DLC**—Distinct changes in wind velocity and direction at the tropopause were shown by a series of radiosonde and pibal observations at Tateno, July 16–22, 1947 and attributed to a vortex which grew out from the frontal wave (Helmholtz type) along the discontinuity surface in the vicinity of the tropopause. Dimensions of the vortex and the relation between the vortex and an observed change in equivalent potential temperature near the tropopause discussed. *Subject Headings:* **1. Tropopause wind relationships 2. Tateno, Japan.**—*From authors' abstract.*

5D–144 551.524.7:551.557

Palmén, Erik and Nagler, K. M., **An analysis of the wind and temperature distribution in a free atmosphere over N. America in a case of approximately westerly flow.** *Journal of Meteorology*, 5(2):58–64, April **1948.** **DWB**—Mean cross section drawn for special situation with approximately westerly flow over N. America and seen to exhibit normal jet stream characteristics. Tropopause seen to have a distinct multiple structure. Stability of the jet discussed. (*Same item as* 4G–13, July 1953, *MAB.*) *Subject Headings:* **1. Upper air analysis 2. Jet stream 3. Multiple tropopause.**—*G.J.E.*

5D–145 551.510.52/3:551.4

Queney, Paul, **The problem of air flow over mountains: A summary of theoretical studies** *American Meteorological Society, Bulletin*, 29(1):16–26, Jan. **1948.** 5 figs., 12 refs., 16 eqs. **DWB**— Under the heading "Effect of atmospheric discontinuities," p. 23, the influence of the tropopause in producing an additional system of waves on the upwind side of a mountain range is pointed out *Subject Headings:* **1. Tropopause 2. Orographic influences 3. Mountain meteorology.**—*M.P.K.*

1949

5D–146 551.510.52/3:551.524.

Arai, S. and Kitaoka, T., **On the change of the height of tropopause and its relation to the inversion layer observed on May 9th, 1948, at Wakkanai.** *Tateno, Japan. Aerological Observatory Journal*, 4(4):138–146, Dec. **1949.** 10 figs., 2 tables. In Japanese; figure legends, tables and sum mary (p. 138) in English. **DLC**—Consecutive ascents at Wakkanai, May 7–11, 1948 revealed remarkable inversion layer. A cold front (at 6 hr, May 9th) surface could be traced from the ground to 2.8 mb but no higher. Another inversion layer above the cold frontal surface appeared at 3 km at 6 hr and, increasing its height with time, became a new tropopause at 16 hr. The lapse-rate o the atmosphere between the inversion layer and the old tropopause decreased with time so that th tropopause vanished at about 12 km at 16 hr. This phenomenon is different from the circumstance pointed out by PALMÉN. *Subject Headings:* **1. Tropopause height 2. Inversions 3. Wakkana Japan.**—*From authors' abstract.*

5D–147 551.510.

Brewer, A. W., **Evidence for a world circulation provided by the measurements of helium an water vapor distribution in the stratosphere.** *Royal Meteorological Society, Quarterly Journa* 75(326):351–363, Oct. **1949.** 5 figs., 16 refs., 13 eqs. **DWB**—Observations of vertical distributio of water vapor and helium show that in air just above tropopause, the humidity mixing ratio fal in 1 km by nine tenths to 195–200°A. This is attributed to equatorial air dried by condensatio moving polewards in lowest stratosphere. Helium is constant with height indicating turbulenc compatible with strong wind sheer just above tropopause. *Subject Headings:* **1. Tropopause humidit 2. Stratospheric circulation 3. Stratospheric turbulence.**—*C.E.P.B.*

5D–148 551.513.2:551.55

Defant, Albert, **Neuere Ansichten über die allgemeine Zirkulation der Atmosphäre in mittlere Breiten.** [Recent views on the general circulation of the atmosphere in middle latitudes.] *Archi für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 1(3/4):273–294, **1949.** 9 figs., 18 refs 13 eqs. German, English and French summaries, p. 273–275. **MH-BH**—Summarizes his own wor and ROSSBY's work at Chicago. In about 40°N, at 5–15 km, is a band of very strong west win (jet stream), maximum near tropopause, in or just south of a zone of maximum temperature gradien In jet, tropopause drops steeply northward and is often double. (For fuller abstract *see item* 4G–1 July 1953, *MAB.*) *Subject Headings:* **1. Tropopause wind relationships 2. Jet stream 3. Trop pause slope 4. Multiple tropopause.**—*C.E.P.B.*

5D–149 551.506.7(7

*Henry, T. J. G. and Armstrong, G. R., **Aerological data for northern Canada.** Toronto, Dep of Transportation, Meteorological Division, **1949.** 271 p. figs., charts, extensive tables, map Review by F. K. Hare in *Arctic*, 3(1):66–67, April **1950. DWB**—A summary of all available aer logical data for that part of Canada north of latitude 58°. In addition to extensive normal tem perature and pressure maps (850, 700, 500 and 300 mb) and 229 p. of monthly surface and upper a data of temperature, pressure, humidity, winds, clouds and weather, there is a discussion of th stability of the tropopause in winter from which conclusions are reached that are not in agreeme with those of COURT (*see* 5D–120 above). An apparently unsuccessful attempt is made to fit the findings into the jet stream hypotheses. *Subject Headings:* **1. Tropopause stability 2. Upper air da 3. Northern Canada. I. Hare, F. K.**—*M.P.K.*

5D–150 551.510.52/3:551.515

Hesse, W., **Tropopausenschwankungen bei hochreichenden Kaltlufteinbrüchen.** [Variatio of the tropopause with deep cold waves.] *Zeitschrift für Meteorologie*, 3(5/6):129–135, May/Ju **1949.** 7 figs., 13 refs. English summary in: Pennsylvania State College. Mineral Industri Experiment Station, Contract N189s-80323, Dec. 30, **1951.** Vol. 2, p. B-323–325. **DWB**—Fi types of tropopause are distinguished: among them Type II, inversion, includes 40% and Type multiple tropopause, 13%. Deep cold waves are associated with advection of cold air betwe Atlantic high and a primary depression over northeast Europe, and a descending tropopause; th is gradually replaced by vertical movement and a rising tropopause. The cold wave of Nov. 15–

1942, is investigated in detail; graphs of day to day changes of temperature at 400, 300, 225 mb and tropopause are shown for eight stations. Changes in lower troposphere and tropopause exceed those in upper troposphere. Height of 0°C isotherm follows tropopause height. (*Same item as* 3–42, March 1950, *MAB.*) *Subject Headings:* **1. Atmospheric structure 2. Tropopause types 3. Cold waves.**—*C.E.P.B.*

5D–151 551.506.7(481)

*Johansen, Harald, **Mean upper air data obtained from soundings at Tromsø during the years 1941–44.** *Geofysiske Publikasjoner*, 17(4), **1949.** 28 p. 16 figs., 12 tables, 15 refs. **DWB**—Based on daily soundings at 0230 hours from May 5, 1941 to Oct. 31, 1944, and at 1400 GMT in the last 14 months of this period, made by the German occupation forces. Includes graphs and tables of monthly mean upper air temperatures, pressures, equivalent potential temperature, and potential temperature to 25 km, as well as relative and specific humidities to 5 km. Mean monthly height of the tropopause and corresponding temperatures are also given, as well as lapse rates in the various layers. *Subject Headings:* **1. Upper air data 2. Tropopause height data 3. Tropopause temperature data 4. Tromsø, Norway.**—*R. Quiroz.*

5D–152 551.510.52/3

Kraus, E., **The formation of a laminated tropopause and the mass exchange between the stratosphere and the troposphere.** *Meteorological Magazine*, London, 78(929):322–330, Nov. **1949.** 7 figs., 6 photos., table. **DWB.** Also as: *Great Britain. Meteorological Office. Synoptic Div., Technical Memorandum*, No. 104, May **1945.** Mimeo. **GB-MO**—On Nov. 9, 1944, tropospheric tropical air was observed 12,000 ft above a tropopause in polar air at 410 mb. The trajectories of the air masses were plotted at 500, 400, and 300 mb and showed strong convergence in the polar air, as a result of which vertical divergence dissipated the lower (polar) tropopause and drew stratospheric air into the tropopause. Such outbreaks of cold air with rapid anticyclonic development and tropical air above are frequent. (*Same item as* No. 2–61, Feb. 1950, *MAB.*) *Subject Headings:* **1. Atmospheric structure 2. Multiple tropopause.**—*M.R.*

5D–153 551.510.52/3(52)

Nagai, T. and Matuoka, Y., **On the tropopause at Tateno, 1st report.** *Tateno, Japan. Aerological Observatory, Journal*, 4(4):129–137, Dec. **1949.** 17 figs., 7 tables, 7 refs. In Japanese; figure legends, tables and summary (p. 129) in English. **DLC**—Report of study of tropopause, particularly double, at Tateno, based on 337 radiosonde observations, Jan. 1948–April 1949. All 91 cases of double tropopauses occurred in winter or early spring. The upper tropopause (advective) and the lower tropopause (radiative) appeared at 15.5 km and 10.0 km, respectively, on the average. Maximum winds above Tateno were observed in the region between the two tropopauses. *Subject Headings:* **1. Multiple tropopause 2. Tropopause wind relationships 3. Tateno, Japan.**—*From authors' abstract.*

5D–154 551.571.7:551.510.53

Shellard, H. C., **Humidity of the lower stratosphere; the results of high-level ascents by aircraft of the Meteorological Research Flight.** *Meteorological Magazine*, London, 78(930):341–349, Dec. **1949.** 7 figs., 2 tables, 2 refs. **DWB**—Results of 64 flights reaching stratosphere are discussed, with tropopause as reference level. A more precise definition is given of Types I, II, III of tropopause. Mean R.H. drops from 43% at tropopause to 5.3% 25 mb above and 2.7% 75 mb above. Fall of frost point from 50 mb below to 50 mb above, is 5.8°F in Type I, 1.9 in Type II. There is often a discontinuity in frost point in Type I, but not in Type II. Significant correlation is found between frost point and pressure and temperature. (*Same item as* 3–99, March 1950, *MAB.*) *Subject Headings:* **1. Upper air humidity 2. Stratosphere 3. Tropopause types.**—*C.E.P.B.*

5D–155 551.515

†Venho, S. N., **A study of meteorological phenomena connected with the outflow of polar air masses over western Europe.** *Finland. Ilmatieteellisen Keskuslaitoksen, Toimituksia*, No. 33, **1949.** 75 p. 30 figs., 3 tables, 72 refs., eqs. **MH-BH**—A detailed synoptic aerological study of the structure and movement of a cold polar air mass which passed over northern Europe during late April 1939. In addition the problems of anticyclogenesis, seclusion of cold air, the formation of the upper level cyclone and the characteristics of the tropopause (based on data from seven stations in north and west Europe) are considered. Tropopause varied from 6.0 to 10.9 km during the passage of this air mass. (*Same item as* 10–70, Oct. 1950, *MAB.*) *Subject Headings:* **1. Synoptic-aerological studies 2. Anticyclones 3. Cyclogenesis 4. Tropopause height.**—*M.R.*

5D–156 551.508.822:551.510.52(99)

*Viaut, André; Jalu, Raymond and Chabasseur, Robert, **Radiosondages dans l'Antarctique.** [Radiosondes in the Antarctic.] *Académie des Sciences, Paris, Comptes Rendus*, 229(24):1352–1353,

Dec. 14, 1949. table, 2 refs. **DLC**—During a cruise of the "Commandant Charcot" in the Antarctic in the summer of 1948–1949, 25 radiosonde ascents were made (19 reached the tropopause) between 137° and 161°E and 60° to 67°S. The temperature, pressure and height of the tropopause (ranging from 7000 to 9000 m) is given for each ascent, along with the position and maximum height reached. The marked rise in temperature above the sharp tropopause and the structure of the troposphere are shown for one sounding in the vicinity of a cold front wave cyclone. (*Same item as* 2.8–32, Aug. 1951, *MAB.*) *Subject Headings:* **1. Radiosonde ascents 2. Tropopause data 3. "Commandant Charcot" cruise 4. Antarctica.**—*M.R.*

5D–157 551.524.3:551.543:551.515.53

Walker, Gilbert T., **Some correlation coefficients between certain upper air data.** *Great Britain. Meteorological Office, Professional Notes*, No. 97, **1949.** M.O. 420q. Summary in: Pennsylvania State College. Mineral Industries Experiment Station, Contract N189s-80323, Dec. 30, **1951.** p. B227. **DWB**—Correlation coefficients (for June–Oct. 1941 radiosonde data) are given between ozone content, pressure at surface, 5 and 7 km, temperature at 7 km, height of tropopause and day-to-day persistence. Regression equations are calculated. Results are discussed in the light of work by B. and E. Haurwitz (1939). *Subject Headings:* **1. Correlation coefficients 2. Pressure-temperature correlations 3. Tropopause height 4. England.**—*R. Quiroz.*

1950

5D–158 551.52:551.511

*†Albrecht, F., **Untersuchungen über den Wärmehaushalt der Erdatmosphäre und seine thermodynamische Bedeutung.** [Investigations of the heat economy of the earth's atmosphere and its thermodynamic importance.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 17, **1950.** 70 p. 44 figs., 22 tables p. 56–70, 66 refs. **MH-BH**—An outstanding contribution to the knowledge of the role played by water vapor and radiation balance in the general circulation, cyclo- and anticyclogenesis, trade winds, rainfall, subsidence, tropopause height (and temperature), etc. The author has collected an enormous amount of aerological data since 1930, and during the winter of 1946–1947 he worked up a great many individual and mean soundings, charts and schematic diagrams showing the effects of radiative exchange on the above elements in various latitudes and regions of the earth. The essence of the material is also presented in 15 large pages of summary tables. In addition there is a good bibliography on the subject. (For fuller abstract *see item* 2.3–79, March 1951, *MAB.*) *Subject Headings:* **1. Energy exchange 2. Thermodynamics of the atmosphere 3. Tropopause height.**—*M.R.*

5D–159 551.524.7:551.515.127(54)

Ananthakrishnan, R., **On the changes in the thermal structure of the atmosphere over Agra associated with the passage of a western disturbance in winter.** *Indian Journal of Meteorology and Geophysics*, 1(1):45–52, Jan. **1950.** 3 figs., 4 tables, 3 refs. **DWB**—Upper-air soundings made at Agra during the period Jan. 2 to 11, 1938, are analyzed and data presented in tables and graphs. A westerly disturbance was associated with large fluctuations of temperature at the tropopause level (16 km) which are ascribed to horizontal oscillations of the atmosphere of the type studied by V. and J. Bjerknes, Solberg and Bergeron (1933). (*Same item as* 5-54, May 1950, *MAB.*) *Subject Headings:* **1. Upper air temperatures 2. Synoptic-aerological studies 3. Tropopause temperature 4. Agra, India.**—*M.R.*

5D–160 551.515.21

*Arakawa, H., **Fine structure of a mature typhoon.** Paper presented at 4th Research Meeting of M.R.I., March **1950.** Typewritten copy (in English) available at U. S. Air Force Geophysics Research and Development Board Library, Cambridge, Mass. Original unchecked.—Complete aerological data for typhoon "Kitty" (Aug.–Sept. 1949) obtained at Haneda and Tateno, with analysis of the typhoon's structure, including mention of tropopause height variations above it. *Subject Headings:* **1. Typhoon structure 2. Tropopause height data 3. Typhoon "Kitty" (1949) 4. Tropopause in typhoons.**—*R. Quiroz.*

5D–161 551.587(676.2):551.524.7

*Carruthers, Nellie, **Upper air over Nairobi, 1°16′S 36°51′E. 5371 ft. above M.S.L. A preliminary survey of data to the end of 1949.** *Great Britain. Meteorological Research Committee, M.R.P.* 554, April 18, **1950.** 4 p. 2 figs., 5 tables. **DWB**—A survey of 1947–49 upper air temperature, upper winds and distribution of pressure and temperature at the tropopause (table V). Relation of tropopause height to wind at different levels is not examined. (*Same item as* 5.3–303, March 1954, *MAB.*) *Subject Headings:* **1. Upper air winds 2. Tropopause temperature data 3. Tropopause pressure data 4. Tropopause height data 5. Nairobi, East Africa.**—*M.P.K.*

5D–162 551.524.7:551.510.52/3

Dewar, D., **Frequencies of tropopause temperatures over Larkhill from June 1945 to December 1947.** *Meteorological Magazine*, London, 79(931):27–28, Jan. **1950.** table. **DWB**—Seasonal frequencies by steps of .2°F. Summary:

	Dec.–Feb.	Mar.–May	June–Aug.	Sep.–Nov.
Mean °F	−77.2	−71.0	−65.2	−73.3
Standard error of mean	1.5	1.3	1.0	1.1

(*Same item as* 4–81, April 1950, *MAB.*) *Subject Headings:* **1. Upper air temperatures 2. Tropopause temperature 3. Larkhill, England.**

5D–163 551.513:551.524.7:551.571.7:551.557

†*Flohn, Hermann, **Grundzüge der allgemeinen atmosphärischen Zirkulation auf der Südhalbkugel.** [Fundamentals of the general atmospheric circulation over the Southern Hemisphere.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 2(1):17–64, **1950.** 12 figs., 22 tables, 65 refs. **DWB**—An important contribution to the climatology of the free atmosphere, integrating all of the aerological data available at the time for the Southern Hemisphere, with that obtained from the German Antarctic Expedition of 1938/1939 (as yet unpublished). Radiosondes used on this expedition (Marine-Sonde) are compared with the Lang-Sonde, with deviations for every level up to 10 gkm shown for mid-latitudes and for the Antarctic. Corrections for radiation errors are applied to the data for 10 to 20 gkm, as well as for lower levels. Among the useful tables and graphs which are presented, are: mean temperatures for various latitudes for various levels up to 20 gkm, as well as the actual data on which the means are based; relative topography for various latitudes 500/1,000 mb, 225/500 mb, 96/225 mb and 41/96 mb; comparative data for Arctic stations; meridional cross section of temperature; height and temperature of the tropopause determined from actual data and also from graphical smoothing. Similar data for relative and specific humidity, pressure (absolute topography of isobaric surfaces) and wind are presented and analyzed in terms of the zonal and meridional flow and the other elements of the general circulation. Finally, there is a more detailed analysis of upper-air flow over the Antarctic. The bibliography lists 65 of the most important works on upper-air conditions in the Southern Hemisphere. (*Same item as* 6–39, June 1950, *MAB.*) *Subject Headings:* **1. Tropopause height data 2. Atmospheric circulation 3. Upper air climatology 4. Antarctica 5. Southern Hemisphere.**—*M.R.*

5D–164 551.510.41:523.4

Goldie, A. H. R., **The Martian atmosphere.** *Weather*, 5(9):329, Sept. **1950.** ref. **DWB**—Calculates height of tropopause on Mars as 50 km in middle latitudes and 67 km at equator. (*Same item as* 11–55, Nov. 1950, *MAB.*) *Subject Headings:* **1. Tropopause height 2. Mars 3. Planetary atmospheres.**

5D–165 551.510.53:551.524.7:551.521.3:551.558

Goody, R. M., **The experimental determination of the thermal state of the lower stratosphere.** (In: Royal Meteorological Society, **Centenary Proceedings,** p. 9–18, **1950.** fig., 25 refs., eqs.) **MH-BH**—Turbulence near the tropopause may be estimated from the distribution of gases in stratosphere by measurements of diffusion of particles, and through observations of the behavior of balloons and aircraft. (*Same item as* 2.3–50, Mar. 1951, *MAB.*) *Subject Headings:* **1. Clear air turbulence 2. Stratosphere 3. Tropopause turbulence.**—*C.E.P.B.*

5D–166 551.551

Hislop, G. S., **Gusts—from a clear sky.** *Aircraft*, Melbourne, 29(3):18–19, 40–41, Dec. **1950.** 5 figs., table, eq. **DLC**—As a result of more than 90,000 miles of flight with two Mosquito Aircraft over Europe at levels between 15,000 and 37,000 ft, it is concluded that a marked wind gradient in the vertical associated with strong horizontal temperature gradient was the most likely cause of turbulence. Half of the cases of high level turbulence were within 2000 ft of the tropopause. (*Same item as* 3K–152, Nov. 1952, *MAB.*) *Subject Headings:* **1. Clear air turbulence 2. Gustiness 3. Tropopause turbulence.**—*M.R.*

5D–167 551.501.7(26)

Hutchings, J. W., **A meridional atmospheric cross section for an oceanic region.** *Journal of Meteorology*, 7(2):94–100, April **1950.** 3 figs., 5 tables, 3 refs. **DWB**—Based on radiosonde data for 1943–1947 at a dozen stations in the Southwest Pacific, summer and winter means of upper-air temperature and wind (at standard heights to 20/km) and heights of principal isobaric surfaces have been compiled and are presented in the form of tables or mean cross sections along the 170th meridian E. The cross sections show the maximum west-wind field (jet stream) to be in the zone where the tropical tropopause (16 km) overlaps the polar tropopause (10–12 km). (*Same item as*

7–40, July 1950, *MAB.*) *Subject Headings:* **1. Upper air temperatures 2. Jet stream 3. Tropical tropopause 4. Antarctic tropopause 5. Southern Hemisphere 6. Southwest Pacific.**—*M.R.*

5D–168 551.506.7(519)

*Japan. Central Meteorological Observatory, Tokyo, **Aerological data of Korea, 1942, 1943 and 1944.** Tokyo, July **1950.** 3 Vol. In English. **DSI**—Daily free air pressure, temperature and humidity data for standard levels up to 15 km for each month from Jan. 1942 through Dec. 1944 and wind aloft data for 1943 and 1944 are presented in tabular form for the one station—Inchon, Korea. (*Same item as* 2.7–28, July 1951, *MAB.*) *Subject Headings:* **1. Upper air data 2. Tropopause data 3. Inchon, Korea.**—*M.R.*

5D–169 551.506.7:551.508.822(52)

*Japan. Central Meteorological Observatory, Tokyo, **Aerological data of Japan (radiosonde) October, November and December 1948.** Tokyo, March, July and Sept. **1950.** 60; 80; 60 p. all tables. Also: **Aerological data of Japan during the international aerological days December 8th–17th, 1949.** Tokyo, March **1950.** 45+p. numerous figs. and tables. In English. And: **Aerological data of Japan. Winds aloft March 1948 and June 1948.** Tokyo, March, Aug. **1950.** 99, 88 p. And: **Aerological data of Japan, February 1950.** Tokyo, March **1950.** 212 p. **DWB**—1) Daily free air pressure, temperature, humidity and heights of pressure surfaces are presented for 13 stations in Japan for standard levels up to 20 km. 2) Upper air data given for the period Dec. 8–17th, 1949. 3) In this series both radiosonde (pressure, temperature, humidity, height and tropopause data) and winds aloft are presented for 12 stations. In wind summaries, the mean velocity, the most frequent direction and the maximum velocity of the month are given for each station for 00, 06, 12 and 18h. Radiosonde data are also summarized. 4) Wind aloft data for 23 stations (1–4 times daily) presented in detailed tables for each day of the month. (*Same item as* 4.3–46, March 1953, *MAB.*) *Subject Headings:* **1. Radiosonde data 2. Upper air data 3. Upper air wind data 4. Tropopause data 5. Japan.**—*M.R.*

5D–170 551.555

§Koch, H. G., **Über die Aerologie der Etesien des östlichen Mittelmeeres im Sommer 1942.** [Aerology of the etesian winds in the eastern Mediterranean in the summer of 1942.] *Germany. Deutsche Demokratische Republik. Meteorologischer Dienst, Abhandlungen*, No. 1:7–39, **1950.** 17 figs., 19 tables, 7 refs. **DWB**—Cross sections, adiabatic diagrams of soundings and considerable data illustrate the depth of the intruding cold air mass, the tropopause and the thermodynamic changes and cloud formation associated with the etesian winds (strong north or northwest winds) in the region of Greece and the Aegean Sea. (For fuller abstract *see item* 10–111, Oct. 1950, *MAB.*) *Subject Headings:* **1. Etesian winds 2. Synoptic aerological studies 3. Tropopause 4. Cloud forecasting 5. Greece 6. Aegean Sea.**—*M.P.K.*

5D–171 551.515.7:551.509.3

Kurashima, A. and Arai, Y., **On the structure of cold air (2nd paper).** *Journal of Meteorological Research*, Tokyo, 2(7):209–216, July **1950.** 12 figs. In Japanese; English summary p. 4. **DWB**—An analysis of several synoptic situations in the western Pacific by means of cross sections (both in time and space) showing conditions in the upper troposphere and tropopause at a time when there is an intrusion of a cold dome over the area. Studies of European situations by PALMÉN are discussed and compared with present conclusions regarding inversion or isothermal layer above cold dome. (*Same item as* 2.6–60, June 1951, *MAB.*) *Subject Headings:* **1. Upper air analysis 2. Atmospheric structure 3. Tropopause 4. West Pacific.**—*M.R.*

5D–172 551.587(265)

Loewe, F. and Radok, U., **A meridional aerological cross section in the Southwest Pacific.** *Journal of Meteorology*, 7(1):58–65, Feb. **1950.** 5 figs., 7 tables, 32 refs. **DWB, DLC, MH-BH**—A comprehensive analysis of recent upper air temperature, pressure and wind data for the entire Southern Hemisphere, with frequent comparisons between Southern and Northern Hemisphere conditions. The troposphere in temperate and high latitudes of the Southern Hemisphere is colder than in the Northern, due to the greater cloudiness and higher albedo in the south. Analysis of tropopause height data shows a break between 30° and 40°S similar to that in the Northern Hemisphere. The jet stream lies nearer the equator in winter than would be expected. Also, the highest temperatures at the tropopause occur in temperate latitudes in winter, and at the poles in summer; and at that level it is warmer in winter than in summer in the tropics and temperate regions of the Southern Hemisphere. (*Same item as* 5–101, May 1950, *MAB.*) *Subject Headings:* **1. Synoptic aerological studies 2. Tropopause temperature 3. Jet stream 4. Tropopause breaks 5. Southern Hemisphere.**—*M.R.*

5D–173 551.547.3:551.510.52/3

Noth, Hermann, **Die Tropopause über Strassburg im Januar und Februar 1949 und einige Schlussfolgerungen.** [The tropopause over Strassburg in Jan. and Feb. 1949 and some conclusions.] *Germany. Deutscher Wetterdienst in der U. S. Zone, Berichte*, No. 12:263–265, **1950.** 3 figs., ref. English summary in: Pennsylvania State College. Mineral Industries Experiment Station, Contract N189s-80323, Dec. **1951.** p. B-295. **MH-BH**—From radiosonde ascents thicknesses of 100–225 mb and 225–500 mb levels were plotted; correlation coefficients negative. Discussed in terms of "neutral point" between stratosphere and troposphere. (*Same item as* 9–95, Sept. 1950, *MAB.*) *Subject Headings:* **1. Upper air pressure 2. Tropopause 3. Strassburg, France.**—*C.E.P.B.*

5D–174 551.551:551.557:629.13

Research into clear gusts. *Aeroplane*, London, 78(2020):237–238, Feb. 24, **1950.** 2 photos. **DLC**—A brief review of two years of clear air gust investigations during which BEA's Gust Research Unit flew more than 90,000 mi at heights between 15,000 and 35,000 ft. Only conclusive discoveries are that turbulence occurs most often near the tropopause and near jet streams. (*Same items as* 9–99, Sept. 1950, *MAB.*) *Subject Headings:* **1. Clear air turbulence 2. Jet stream turbulence 3. Tropopause turbulence.**—*M.P.K.*

5D–175 551.515.127(7)

Riehl, Herbert, **Variations in the structure of high-level cyclones.** *American Meteorological Society, Bulletin*, 31(8):291–294, Oct. **1950.** 4 figs., 6 refs. **MH-BH**—From an analysis of 300 mb charts and of cross sections from Miami to Arctic Bay, etc. during presence of unusually marked upper cyclones, it was noted that often these vortices contain a deep body of extremely cold air and a high tropopause, but that there is always a low tropopause somewhere on the cross section, often displaced by 20° latitude. Conclusion is that low tropopause is associated with jet stream which lies south of vortex center. (*Same item as* 2.3–72, March 1951, *MAB.*) *Subject Headings:* **1. Upper level cyclones 2. Tropopause height 3. Meridional cross sections 4. North America.**—*M.R.*

1951

5D–176 551.515.2:551.510.5

Arakawa, A., **Analysis of the tropopause and the stratospheric field of temperature of a mature typhoon.** *Papers in Meteorology and Geophysics*, Tokyo, 2(1):1–5, March **1951.** 2 figs., 2 tables, 5 refs., eqs. In English. **MH-BH**—An analysis of swarm ascents during the passage of the typhoon "Kitty" indicate that in a typhoon circulation of mature stage of development there is downward displacement and warm air in the field of tropopause funnel in the cyclone core, and upward displacement and cold air in the field of the annular tropopause ridge in the storm area. (*Same item as* 3.2–78, Feb. 1952, *MAB.*) *Subject Headings:* **1. Typhoon structure 2. Tropopause funnels.**—*From author's abstract.*

5D–177 551.513.1:551.511

Arakawa, Hidetoshi, **Tropopause in a steady zonal wind field.** *Meteorological Society of Japan, Journal, 2nd Ser.*, 29(3):86–89, March **1951.** 2 refs., 6 eqs. In English; English and Japanese summaries 86–87, 89. **MH-BH**—The equations of a steady zonal wind are solved, giving continuous nearly straight isobars with a slope at the tropopause steeper than those of neighboring isobaric surfaces in temperate latitudes. Above this the meridional temperature gradient changes direction. Jet streams are most probable near the tropopause in the westerlies; north of this the tropopause dips. (*Same item as* 3.3–112, March 1952, *MAB.*) *Subject Headings:* **1. Jet stream 2. Tropopause theory.**—*C.E.P.B.*

5D–178 551.551:551.557:656.7

*Bannon, J. K., **Meteorological aspects of turbulence affecting aircraft at high altitude.** *Great Britain. Meteorological Office, Professional Notes*, No. 104, **1951.** 16 p. 15 tables, 11 refs. M.O. 524d. **DWB**—Gives data of frequency of turbulence and bumpiness in clear air, measured by aircraft at 20,000 to 40,000 ft, both in absolute height and relative to tropopause. Maximum frequency within 1000 ft of tropopause. Winter worst season. A shallow bumpy layer is often found just above tropopause, and in other temperature irregularities. Bumpiness is often associated with jet streams. (*Same item as* 3.2–119, Feb. 1952, *MAB.*) *Subject Headings:* **1. Upper air turbulence 2. Tropopause turbulence 3. British Isles.**—*C.E.P.B.*

5D–179 551.510.53:551.513

Clarkson, L. S., **Evidence for a stratospheric circulation in vertical meridional planes between polar and equatorial regions in winter.** *Meteorological Magazine*, London, 80(953):309–318, Nov. **1951.** figs., 23 refs. **MH-BH**—Author discusses recent cross sections from Arctic to Antarctica.

Tropopause at equator is lower and warmer in July than Jan. In Antarctica, troposphere is much colder than in Arctic especially in summer. As causes, greater extent of oceans and greater cloudiness are inadequate and transport of ozone is adopted as main cause. This leads to a unified scheme of stratospheric circulation, consisting of a descent at equator, flow in lower stratosphere from equator to pole, ascent at pole and return flow at greater heights. In winter this circulation is stronger in the Southern than in Northern Hemisphere. This is consistent with GOLDIE's reconstruction. (*Same item as* 3.3–90, March 1952, *MAB.*) *Subject Headings:* **1. Stratospheric circulation 2. Meridional circulation 3. Tropopause.**—*C.E.P.B.*

5D–180 551.551:551.557

Clear air turbulence. *Esso Air World*, New York, 3(5):128–130, March/April **1951.** 5 figs. **DWB**—Popular article with considerable technical information on clear air turbulence, methods of instrumentation and observations at 15,000–35,000 ft, and advice to pilots for avoiding areas of turbulence (such as in jet stream or near the tropopause). (*Same item as* 3K–168, Nov. 1952, *MAB.*) *Subject Headings:* **1. Clear air turbulence 2. Jet stream turbulence 3. Tropopause turbulence.**—*M.R.*

5D–181 551.557

Cólon, José A., **On the wind structure above the tropopause over Puerto Rico.** *American Meteorological Society, Bulletin*, 32(2):52–53, Feb. **1951.** 2 tables, 3 refs. **MH-BH**—Results of 89 soundings, which reached 20 km or more, are given in the form of wind roses for each km level from 1 km below the tropopause (16–17 km s.l.) to 7 km above the tropopause. At the tropopause the prevailing winds change from W or NW to ENE and the easterlies reach maximum frequency at 3 km above tropopause and are about 6 km deep. They are more pronounced in summer than in winter. (*Same item as* 4F–68, June 1953, *MAB.*) *Subject Headings:* **1. Tropopause wind relationships 2. Upper air winds 3. Krakatoa winds 4. San Juan, Puerto Rico.**—*M.R.*

5D–182 551.510.52/3(54)

Dewar, D., **Abrupt seasonal changes in tropopause level and stratosphere temperature at Habbaniya.** *Meteorological Magazine*, London, 80(953):323–326, Nov. **1951.** 2 figs. **MH-BH**—Daily radiosonde ascents at Habbaniya 1948–1950 show an abrupt rise of tropopause in May or early June and descent in Oct., with a corresponding change from temperate to tropical regime. In transition periods tropopause is often double. (*Same item as* 3.3–87, March 1952, *MAB.*) *Subject Headings:* **1. Stratosphere 2. Tropopause height 3. Habbaniya, Iraq.**—*C.E.P.B.*

5D–183 551.510.3:551.510.53:551.547

Doporto, Mariano, **The isopycnic level and the coupling of tropopause and surface waves.** *Annales de Géophysique*, Paris, 7(4):256–261, **1951.** 5 figs., 2 tables, 5 refs. English and French summaries p. 256. **MH-BH**—By computing the correlation coefficient between the pressure at the ionopycnic level and the difference of pressures at the surface and the isopycnic level, staggering one of the series relative to the other, the period of difference of phase of simple periodicities can be determined. There is evidence that both period and phase of any such periodicities are not constant. (*Same item as* 4.3–85, March 1953, *MAB.*) *Subject Headings:* **1. Isopycnic level 2. Periodicities 3. Tropopause correlations 4. Upper air pressure.**—*Author's abstract.*

5D–184 551.571.7

Frith, Ronald, **Recent work of the Meteorological Research Flight of the Meteorological Office.** *Royal Meteorological Society, Quarterly Journal*, 77(333):478–480, July **1951.** 3 figs., 3 refs. **MH-BH**—Examples of changes of temperature and frost point between 20–40,000 ft are shown. About half the ascents give a sharp fall of frost point at tropopause, mainly when tropopause is also sharp; others show the fall thousands of feet below. Mean lapse of frost point below tropopause is 3.5°F/1000 ft, above, 5°/1000 ft to −100°F, then constant at −110°. (*Same item as* 2.11–129, Nov. 1951, *MAB.*) *Subject Headings:* **1. Upper air humidity 2. Tropopause humidity relationships 3. Frost point.**—*C.E.P.B.*

5D–185 551.510.52/3(931)

*Gabites, J. F. and Porter, Elizabeth M., **The tropopause over the New Zealand region.** *New Zealand. Meteorological Office, Circular Note*, No. 75, Oct. 17, **1951.** 6+p. 5 figs., 11 tables, 11 refs. **DWB**—Tropopause data are presented for five radiosonde stations operated by the New Zealand Meteorological Service ranging from latitude 18°S to 46°S. A tropical tropopause near 100 millibars occurs throughout the year over Fiji. At the temperate latitude stations either the tropical tropopause or the polar tropopause around 200–300 millibars, or both, may appear. The tropical tropopause has its greatest southward extension in late summer, but even in winter is still present occasionally at 46°S. The polar tropopause appears as far north as 29°S at any season

but most frequently in winter. There is strong evidence that the tropical tropopause over Fiji lowers by about 1 kilometre in winter compared with the late summer heights. *Subject Headings:* **1. Tropical tropopause 2. Antarctic tropopause 3. Tropopause height 4. New Zealand 5. South-west Pacific.**—*Authors' abstract.*

5D–186 551.510.52/3(729.5)

Graves, Maurice E., **The relation between the tropopause and convective activity in the sub-tropics (Puerto Rico).** *American Meteorological Society, Bulletin*, 32(2):54–60, Feb. **1951.** 13 figs., 6 refs. **MH-BH**—Contrary to prevalent belief, there is no relation between the high, cold tropopause of the subtropics and convective activity in the troposphere and, furthermore, the secondary tropopause rises prior to cessation of convective activity for 48 hours or more. These conclusions were reached after studying temperature lapse rate curves based on radiosonde data for San Juan, Puerto Rico, for 1942–1945 and comparing them with wind, pressure and rainfall index data for the same period. (*Same item* 2.11–55, Nov. 1951, *MAB.*) *Subject Headings:* **1. Tropopause theory 2. Multiple tropopause 3. Convective activity 4. Rainfall index 5. San Juan, Puerto Rico.**—*M.R.*

5D–187 551.5:629.13

Harrison, Henry T., **Some meteorological problems indicated for jet transport operation at 40,000 ft.** *Aeronautical Engineering Review*, 10(4):52–61, April **1951.** 13 figs., 6 refs. Abstracted from reprint. **DWB, DLC**—Statistics are presented to show the magnitude of temperature, wind and turbulence at 40,000 ft and the success which present-day forecasting methods achieve for jet transport operation at these levels. Graph shows Jan. and July average heights of the tropopause over the U. S. as computed from U. S. Weather Bureau data, 1939–44. (*Same item as* 3.1–17, Jan. 1952, *MAB.*) *Subject Headings:* **1. Upper air flights 2. Jet aircraft 3. Tropopause height 4. United States.**

5D–188 551.551:551.557

Hislop, G. S., **Clear air turbulence over Europe.** *Royal Aeronautical Society, Journal*, 55(484): 185–225, April **1951.** 14 figs., 2 tables, 19 refs. **DWB**—A comparative summary of observations and experiments made by the Ministry of Supply with cooperation of the Meteorological Office and the Ministry of Civil Aviation using British European Airlines equipment, between April 1948 and Jan. 1950, over Europe. Meteorological aspects are discussed at length (relation to tropopause, jet stream, vertical currents, wind speed, fronts, terrain, etc.). Data compared with those from U.S.A. (United Airlines) and BOAC, de Haviland, etc. in the United Kingdom. Chart shows path of flights. Type maps show synoptic situations favorable for high-level turbulence. (*Same item as* 3K–172, Nov. 1952, *MAB.*) *Subject Headings:* **1. Clear air turbulence 2. Tropopause turbulence 3. Europe.**—*M.R.*

5D–189 551.515.1:551.510.52/3

Kleinschmidt, Ernst, Jr., **Untersuchung eines Tropopausentrichters mit Hilfe der ERTELschen Wirbelinvarianten Z.** [Investigation of a tropopause funnel by means of ERTEL's whirl-invariant Z.] *Annalen der Meteorologie*, 4(1/6):131–132, **1951. MH-BH**—Summary and discussion of a paper "Über Aufbau und Entstehung von Zyklonen III," (On the origin and development of cyclones) in *Meteorologische Rundschau*, 4(5-6):89–96, May/June 1951. (*Same item as* 3.3–117, March 1952, *MAB.*) *Subject Headings:* **1. Cyclone structure 2. Tropopause funnels.**—*C.E.P.B.*

5D–190 551.506.5:551.510.52:551.557.3(99)

Liljequist, Gösta, **Den norsk-brittisk-svenska antarktisexpeditionen 1949–52. En översikt av färder och arbeten intill mitten av december.** [The Norwegian-British-Swedish expedition of 1947–52 to the Antarctic. A survey of expeditions and work up until the middle of Dec.] *Ymer*, Stockholm, 71(2):81–113, **1951.** photos, tables. English summary p. 112–113. **DWB**—The personnel, equipment, plans of the quarters and laboratories, as well as the main findings of the meteorological investigations are contained in this overall report of the expedition. A weakly defined tropopause was identified in winter and a sharply defined tropopause in summer. Winds aloft were usually strong and turbulent, and from W or WSW in the upper troposphere, but S or E in the lower layers. The camp was located at 71°S and 11°W. Excellent photographs of various phases of the expedition are included. (*Same item as* 3.11–44, Nov. 1952, *MAB.*) *Subject Headings:* **1. Antarctic expeditions 2. Antarctic tropopause 3. Upper air winds 4. Maudheim Expedition, 1949–1952 5. Antarctica.**—*M.R.*

5D–191 551.511:551.510.52/3

Lowell, S. C., **The boundary conditions at the tropopause.** *Tellus*, 3(2):78–81, May **1951.** 2 refs., 22 eqs. **MH-BH**—The discontinuity surface at the tropopause does not have the characteristics of a surface which moves with the speed of sound, so it must move with the atmosphere

itself. In this respect it acts like a front. By solving the equations for discontinuities of this type it is seen that at the tropopause 1) the pressure gradient is continuous, 2) there is no difference in acceleration of particles on either side, 3) no velocity convergence or divergence, 4) the vertical wind shear is normal to the tropopause and 5) the change in mass divergence is proportional to change in temperature lapse rate, to the solenoidal term, to the wind component perpendicular to the tropopause, etc. (*Same item as* 3.1–81, Jan. 1952, *MAB.*) *Subject Headings:* **1. Tropopause discontinuities 2. Dynamics of the atmosphere.**—*M.R.*

5D–192 551.521.6

Möller, Fritz, **Long-wave radiation.** (In: **Compendium of meteorology.** Boston, American Meteorological Society, **1951.** p. 34–49. 5 figs., 4 tables, 51 refs., 18 eqs.) **MH-BH**—It was formerly thought that study of long wave radiation in the atmosphere would solve the problem of variations (with latitude and time) in the height and temperature of the tropopause or of other inversions. Today the emphasis is more on the radiative balance and heat budget of the atmosphere. The three radiators are H_2O, CO_2 and O_3 for the wave lengths from 4 to 100μ. First the theory of absorption and scattering is outlined and formulated. Then radiation diagrams of ELSASSER and MÖLLER, and their theoretical basis, are explained and use illustrated. Radiation from haze layers below tropopause is considered as are also the complicated effects of clouds on radiation and vice versa. Polar tropopause thought probably caused by radiation from water vapor layers, whereas in the tropical tropopause the layer of maximum cooling lies 4–5 km below the tropopause, so the mechanism of its formation as well as its structure is probably different. GOODY suggests H_2O, O_3 and CO_2 balance as cause of both polar and tropical tropopause. (For fuller abstract *see item* 3.11–6, Nov. 1952, *MAB.*) *Subject Headings:* **1. Infrared radiation 2. Carbon dioxide absorption 3. Ozone absorption 4. Radiation diagrams 5. Tropopause formation. I. Elsasser, W. M.**—*M.R.*

5D–193 551.51

Raethjen, Paul, **Das planetarische Zirkulationssystem.** [The planetary circulation system.] *Annalen der Meteorologie*, 4(1–6):65–75, **1951.** 5 figs., table, 7 refs., 4 eqs. German and English summaries, p. 65. **MH-BH**—After discussing and illustrating the planetary and monsoon-like parts of the general circulation, author describes a weak but permanent "tropopause circulation," polewards in lower stratosphere, equatorwards below. Finally, the dynamics and kinematics of polar front instability are modelled and the bearing of the author's ideas on weather forecasting considered. (For fuller abstract *see item* 3.3–110, March 1952, *MAB.*) *Subject Headings:* **1. Tropopause circulation 2. General circulation.**—*C.E.P.B.*

5D–194 551.510.52/3:551.55

†Sawyer, J. S., **Day to day variations in the tropopause. Their causes and significance.** *Great Britain. Meteorological Research Committee, M.R.P.*, 612, Feb. **1951.** 20 p. 33 figs., 2 tables, 46 refs. **DWB**—A complete survey of recent studies of the tropopause introduces an exhaustive synoptic-aerological investigation of the tropopause based on 6- and 12-hourly radiosonde data from North American and European stations for May 1949. Various statistical properties of tropopause height variations are summarized, and the report is amply illustrated with selected constant pressure contour charts, wind and temperature soundings, isobaric charts for the tropopause, etc. Bibliography of 46 items appended. (*Same item as* 4G–80, July 1953, *MAB. See also* 5D–232 below.) *Subject Headings:* **1. Synoptic aerological studies 2. Tropopause variations 3. Tropopause height.**—*U. S. Air Weather Service.*

5D–195 551.510.53:551.515:551.55

Sawyer, J. S., **The dynamical systems of the lower stratosphere.** *Royal Meteorological Society, Quarterly Journal*, 77(333):480–483, July **1951.** 2 figs., 5 refs. **MH-BH**—Contours of tropopause closely follow long-wave pattern in westerlies, but flow cannot be purely horizontal and dynamic developments are discussed. Vertical motion is as important as advection in causing changes of temperature in stratosphere. Jet stream and "tropopause funnel" are referred to; the latter is illustrated by tropopause isobars and upper air ascents of May 17, 1949. (*Same item as* 2.10–5, Oct. 1951, *MAB.*) *Subject Headings:* **1. Stratosphere 2. Tropopause funnels 3. Atmospheric disturbances 4. Vertical motion.**—*C.E.P.B.*

5D–196 551.524.7:551.510.52

Temperature at 200 mb. in relation to the pressure at the tropopause. *Meteorological Magazine*, London, 80(943):25–27, Jan. **1951.** 2 figs., table. **DWB**—Temperature frequency at 200 mb at Larkhill shows two maxima. Temperatures at tropopause were classified according to pressure and show a clear association of high temperature with low tropopause (tropopause below 240 mb, temperature most often −80 to −85°F, above 240 mb, −56 to −61°F.) (*Same item as* 2.7–11,

July 1951, *MAB.*) *Subject Headings:* **1. Upper air temperatures 2. Tropopause pressure 3. Tropopause height 4. Larkhill, England.**—*C.E.P.B.*

5D–197 551.511(02)

†Tverskoĭ, Pavel Nikolaevich (*ed.*), **Kurs meteorologii (fizika atmosfery).** [Course in meteorology (physics of the atmosphere).] Leningrad, Gidromet, Izdat., **1951.** 887 p. 343 figs., 110 tables, eqs., bibliog. p. 862–869. **DLC**—Theoretical considerations are contained in chapters on clouds, temperature, humidity, wind, etc. in the free atmosphere. Paragraph 3 of Chap. 18 (temperature of the free atmosphere) in Pt. III, on the thermal regime of the atmosphere, gives a more realistic meridional cross section of the mean atmospheric temperature distribution from sea level to 20 km, and of the tropopause in summer and winter, than does the classical model with its continuous tropopause. The model in this textbook shows the tropical tropopause at an even 17.5 km in winter and 16–16.5 km in summer from 0° to 40 or 50°N and an independent polar tropopause at 8–12 km (winter) or 10–12.5 km (summer). It also shows frequency distribution of tropopause (6.5–14 km) at Kalinovskiĭ, model of tropopause waves on cyclones and anticyclones and multiple tropopauses. (*Same item as* 3.11–10, Nov. 1952, *MAB.*) *Subject Headings:* **1. Tropopause models 2. Textbooks 3. Kalinovskiĭ, U.S.S.R.**—*M.R.*

5D–198 551.515.7

†Wexler, Harry, **Anticyclones.** (In: **Compendium of meteorology.** Boston, American Meteorological Society, **1951.** p. 621–629. fig., 38 refs.) **DWB**—Brief account given (p. 627–8) of a case of a double tropopause (lower at 11.1 km, −59°C; upper at 15.1 km, −64°C) observed in an "amalgamated anticyclone" of central pressure 1054 mb over Maine, Dec. 23–26, 1949. (For fuller abstract *see item* 3.5–14, May 1952, *MAB.*) *Subject Headings:* **1. Anticyclones 2. Multiple tropopause 3. Anticyclonic structure.**—*M.P.K.*

1952

5D–199 551.557:551.510.52/3

Austin, E. E. and Bannon, John Kerman, **Relation of the height of the maximum wind to the level of the tropopause on the occasions of strong wind.** *Meteorological Magazine*, London, 81(965): 321–325, Nov. **1952.** 2 figs., table, 3 refs. **MH-BH**—For Larkhill and Lerwick 1948–50 frequencies are given of pressure at (a) level of maximum wind $\geqslant$ 70 kt; (b) at tropopause; (c) a–b. Means of (a) and (b) and correlation r between them are: Larkhill 268, 226 mb, r 0.43; Lerwick 278, 244 mb, r 0.18. Results are discussed in relation to structure of jet stream. At Lerwick maximum wind often occurs well above tropopause. (*Same item as* 4.4–174, April 1953, *MAB.*) *Subject Headings:* **1. Upper air winds 2. Jet stream 3. Tropopause wind relationships 4. England.**—*C.E.P.B.*

5D–200 551.524.7:551.510.52/3

Bannon, J. K., **Classification of temperatures in the upper troposphere and lower stratosphere according to tropopause pressure.** *Great Britain. Meteorological Research Committee, M.R.P.*, 731, May 27, **1952.** 12 p. 8 figs., 5 tables, 13 refs. Mimeo. **DAWS**—Both upper air temperature and tropopause pressure (Pc) are functions of advection and vertical motion. For 20 mb steps of Pc, mean pressure-temperature curves 500–100 mb are drawn for Larkhill (England) in Jan., April, July and Oct. 1948–1950. Lapse rates are discussed and causes of variation examined, and several significant correlations found. A high mean lapse rate in lower stratosphere in autumn is related to the autumn minimum of ozone. Suggestions are made for future investigation. (*Same item as* 3.11–143, Nov. 1952, *MAB.*) *Subject Headings:* **1. Upper air temperatures 2. Tropopause height 3. Larkhill, England.**—*C.E.P.B.*

5D–201 551.515:551.551:551.557

Bannon, J. K., **Weather systems associated with some occasions of severe turbulence at high altitude.** *Meteorological Magazine*, London, 81(958):97–101, April **1952.** fig., 2 tables, 6 refs. **DWB**—Ninty-two cases of turbulence $\geqslant$0.4 g above 20,000 ft were classified according to weather situation. Of these, 56 definitely occurred near jet stream; these are plotted on a cross section of a jet drawn from 3 typical cases. Most occurred on low pressure side, some above axis on high pressure side in regions of large vertical or in horizontal shear. Eight were associated with tropopause discontinuities. (*Same item as* 3K–188, Nov. 1952, *MAB.*) *Subject Headings:* **1. Clear air turbulence 2. Jet stream turbulence 3. Tropopause turbulence.**—*C.E.P.B.*

5D–202 551.551:551.524.7

Berggren, Roy, **The distribution of temperature and wind connected with active tropical air in the higher troposphere and some remarks concerning clear air turbulence at high altitude.** *Tellus*, 4(1):43–53, Feb. **1952.** 6 figs., refs., 2 eqs. **MH-BH**—Taking advantage of the extensive European radiosonde network in existence today, the author tackles the problem of extending the investigation

of fronts into the lower stratosphere. Sea-level charts, 500 mb charts and synoptic aerologic cross sections [showing frontal boundaries, tropopauses, inversions, isotherms and isovels (observe wind speed)] serve to illustrate test cases from Oct. and Nov. 1949. (For fuller abstract *see ite* 3K–189, Nov. 1952, *MAB.*) *Subject Headings:* **1. Clear air turbulence 2. Synoptic aerolog 3. Tropopause.**—*M.P.K.*

5D–203 551.551:551.557:551.513

Bracelin, P., **Notes on jet streams and turbulence at high levels.** *Great Britain. Nav Weather Service, Circular*, No. 15/52; NWS 161/52, Aug. **1952.** 7 p. 16 figs., eqs. **DWB**—A excellent summary of information to date on the general characteristics of pressure, temperature an wind field associated with the jet stream. The movements of the jet stream, its connection wit surface fronts and the relations between the jet stream and topography of the tropopause are con mented upon. Figures include vertical cross sections through typical jet streams, surface synopt charts with superimposed 300 mb winds, and schematic cross sections through a warm front, folded tropopause and the confluent entrance to a jet stream. (For fuller abstract *see item* 3K–19 Nov. 1952, *MAB.*) *Subject Headings:* **1. Jet stream 2. Jet stream turbulence 3. Upper air wind 4. Tropopause wind relationships.**—*M.P.K.*

5D–204 551.510.52/3:551.501.45:519.2

Carruthers, Nellie, **Probability paper—an application in upper-air climatology.** *Great Britai Meteorological Research Committee, M.R.P.*, 711, SCIII/124, 26 Jan. **1952.** 8+p. 11 figs., 5 table 2 eqs., 6 refs. Mimeo. **DWB**—The use of probability paper for examining frequency distributio is described. The results of combining two normal distributions differing in mean or standard devia tion, and of plotting platykurtic and leptokurtic distributions are illustrated. The method is the applied to tropopause pressures at Habbaniya (Iraq), giving (except in July) combinations of tw distributions. From discontinuities in upper air temperatures it appears that the total frequenc distribution of tropopause pressures is made up of 10 normal distributions. (*Same item as* 3.7–8 July 1952, *MAB.*) *Subject Headings:* **1. Tropopause pressure 2. Probability paper 3. Hab baniya, Iraq.**—*C.E.P.B.*

5D–205 551.510.52

*Dewar, D., **Extreme tropopause pressure.** *Meteorological Magazine*, London, 81(959):154–15 May **1952.** table. **MH-BH**—Table gives for each month maximum and minimum tropopaus pressures and corresponding heights at Larkhill (51°11′N) and Lerwick (60°8′N) 1948–50. (*Sam item as* 3.9–85, Sept. 1952, *MAB.*) *Subject Headings:* **1. Tropopause height data 2. Tropopaus pressure data 3. England.**—*C.E.P.B.*

5D–206 551.524.36:551.510

Durward, J., **Abrupt seasonal temperature changes at the tropopause and at the surface Habbaniya.** *Meteorological Magazine*, London, 81(959):149–150, May **1952.** fig. **MH-BH-** DURWARD describes falls of surface maximum temperature at Habbaniya by up to 20°F about t dates quoted by DEWAR for fall of stratosphere temperature (*see item* 3.3–87, March 1952, *MAB* DEWAR gives further details. (*Same item as* 3.9–129, Sept. 1952, *MAB.*) *Subject Heading* **1. Maximum temperatures 2. Tropopause temperature 3. Habbaniya, Iraq. I. Dewar, D.**— *C.E.P.B.*

5D–207 551.510.52/3:551.557:551.513

Frost, R., **The upper air circulation in low latitudes and its relation to certain climatologic discontinuities.** *Great Britain. Meteorological Research Committee, M.R.P.*, 706, S.C.III/12 Jan. 28, **1952.** 10+p. 13 figs., 6 tables, 18 refs., 8 eqs. Mimeo. **DWB**—Author discusses t abrupt changes of tropopause in Iraq in late May and Oct., and corresponding discontinuities surface temperature. Sections of temperature and E–W component in 40°E, 0–60°N, up to 1 mb in Jan., April, July, Oct. show a westerly jet in 26°N (Jan.) to 40° (July), crossing Iraq at tim of tropopause change, and an easterly jet in July in 15°N, 100 mb. Causes of the jet streams ar relations to surface conditions and sudden onset of Indian monsoon are discussed. (*Same item* 3.7–87, July 1952, *MAB.*) *Subject Headings:* **1. Dynamic climatology 2. Jet stream 3. Trop pause height 4. Iraq.**—*C.E.P.B.*

5D–208 551.513.1:551.510.

Goldie, Archibald H. R., **The global circulation of stratosphere air and the mechanism of chan of tropopause level.** *Great Britain. Meteorological Research Committee, M.R.P.* 734, rev. De **1952.** 6 p. 6 figs., 4 refs. Mimeo. **DWB**—Jan. and July temperatures and potential te peratures, 500–90 mb at Larkhill are plotted in relation to tropopause pressures and to tropopau at equator. The marked discontinuity at tropopause is attributed to slow air flow towards equat

below and from equator above it. Steepness of the fall of potential temperature in latter current while descending 11,000 ft points to a continual loss of heat, 67% of adiabatic gain in Jan. and 52% in July being lost by radiation. This requires 3–4 weeks. Polar minima require loss of all or more of adiabatic gain. More rapid displacements of tropopause require convergence and vertical motion; the mechanism is discussed with examples. (*Same item as* 4.8–98, Aug. 1953, *MAB.*) *Subject Headings:* **1. General circulation 2. Temperature of the stratosphere 3. Tropopause dynamics.**—*C.E.P.B.*

5D–209 551.506.7(42)

*Great Britain. Meteorological Office, **Upper air data for stations maintained by the Meteorological Office, 1946–50, Part I, Larkhill.** H.M. Stationery Office, **1952.** 52 p. mostly tables, 4 graphs. M.O. 555. **Part 4, Malta.** London, **1953.** 48 p. **GB-MO**—Summaries and frequencies of height, temperature, humidity, and winds, for standard pressure surfaces and of temperature and pressure of tropopause for British stations making radiosonde and radar wind measurements. Most of the data appear in graphic form as well as in contingency tables. (For similar data for Gerwick, Eng. and Habbaniya, Iraq, *see ibid.* Pt. 2, **1952;** Pt. 3, **1953.** M.O. 555.) (*Same item as* 4.3–45, March 1953, *MAB.*) *Subject Headings:* **1. Upper air data 2. Tropopause temperature data 3. Tropopause pressure data 4. Larkhill, England 5. Malta.**—*M.R.*

5D–210 551.524.7

Holzapfel, Rupert, **Grossräumige Störungen im normalen Jahresverlauf oberhalb der Tropopause.** [Large scale disturbances in the normal annual variation above the tropopause.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte,* No. 35:113–116, **1952.** 2 figs., 8 refs. **MH-BH**—Monthly means of temperature at 200 and 225 mb over Erlangen 1947–51 show differences from normal unrelated to those at lower levels. These disturbances indicate that circulations above and below the tropopause are independent. (*Same item as* 4.1–137, Jan. 1953, *MAB.*) *Subject Headings:* **1. Upper air temperatures 2. Tropopause.**—*C.E.P.B.*

5D–211 551.510.52/3

*Holzapfel, Rupert, **Über Häufigkeit und Eigenschaften der Tropopausentypen.** [On the frequency and characteristics of tropopause types.] *Annalen der Meteorologie,* 5(7/12):353–357, **1952.** 2 figs., table, 3 refs. **MH-BH**—Mean height and temperature of tropopause and of types 0–3 (with frequencies) are tabulated for Berlin, Erlangen and Munich, winter and summer 1951, also temperature frequencies. *Subject Headings:* **1. Tropopause types 2. Germany.**—*C.E.P.B.*

5D–212 551.506.7:551.524.7(54)

*Krishna Rao, P. R., **Some high sounding balloon ascents and upper air temperatures up to 35 km over India.** *Indian Journal of Meteorology and Geophysics,* 3(3):173–185, July **1952.** 6 figs., 6 tables, 7 refs. **DWB**—Pressure and temperature data from 34 sounding balloon ascents reaching 30 km and sometimes up to 36 km are presented and summarized. Averages for summer and winter are computed and the tropopause and lapse rate variations discussed. The results do not show any large increase of temperature with height above 25 km, as was estimated previously. (*Same item as* 4.8–41, Aug. 1953, *MAB.*) *Subject Headings:* **1. Vertical temperature gradient 2. Stratosphere 3. Tropopause height 4. India.**—*A.A.*

5D–213 551.524.7

Lina, Lindsay John and Ricker, Harry H., Jr., **Measurements of temperature variations in the atmosphere near the tropopause with reference to airspeed calibration by the temperature method.** *U. S. NACA, Technical Note,* 2807, Oct. **1952.** 23 p. 6 figs., table, eqs. **DWB**—Measurements of temperature variations in the atmosphere near the tropopause over land in the vicinity of Langley Field, Va., are presented. This investigation was made for the purpose of obtaining information on the accuracy of the temperature method (NACA TN 2046) of airspeed calibration over the range of Mach number from 0.6 to 0.8. The temperature surveys and the description of a specially designed thermometer are also presented. (*Same item as* 4.6–133, June 1953, *MAB.*) *Subject Headings:* **1. Upper air temperature variations 2. Tropopause temperature 3. Instrument calibration 4. Aeronautical meteorology 5. Langley Field, Va.**—*Author's abstract.*

5D–214 551.587:551.515.81

McClain, E. Paul and Danielsen, Edwin F., **Aerological investigation of certain Pacific occlusions in the western United States.** Abstract in: *American Meteorological Society, Bulletin,* 33(3):128, March **1952.** Paper delivered at AMS, 116th National Meeting, June 16–18, 1952, Corvalis, Oregon. **DWB**—Structure of these systems is studied by means of vertical cross-sections, time cross-sections, tropopause charts, and other nonroutine analyses. *Subject Headings:* **1. Aerological studies 2. Pacific occlusions 3. Tropopause charts 4. Western United States.**—*M.P.K.*

5D–215 551.510.53(09

Schmauss, August, **Die Entdeckung der Stratosphäre im Jahre 1902.** [The discovery of th stratosphere in 1902.] *Meteorologische Rundschau*, 5(9/10):161–163, Sept./Oct. **1952.** 5 fig **DWB**—In May 1902 ASSMANN and TEISSERENC DE BORT both reported discovery of stratosphere the latter coined terms troposphere and stratosphere. Theories of stratosphere and height tropopause in different latitudes and pressure systems and tropopause types described. (*Sam item as* 4.10–97, Oct. 1953, *MAB.*) *Subject Headings:* **1. Tropopause theory 2. Tropopause type 3. History of meteorology 4. Stratosphere.**—*C.E.P.B.*

5D–216 551.509.31(02

§U. S. Office of Naval Operations, **Practical methods of weather analysis and prognoses.** *U. S Office of Naval Operations*, *NA*50 1P 502, Nov. **1952.** 193 p. 127 figs., tables. Formerly i *NAVAER* 50-110R-51. **DWB**—An elaborate manual setting forth the details of surface, upp air and prognostic analysis used at U. S. Navy Analysis centers (and Fleet Weather Centrals) an the codes, etc. used in transmission and plotting of data. Numerous examples of various chart and analyses and many particular synoptic weather types (for North America, Atlantic and Pacif areas) are included as illustrations. In Chap. III, a comprehensive coverage of tropopause an jet stream analysis is presented (p. 60–67) followed by a discussion of isotach analysis. The manua is well indexed and in addition to synoptic charts there are mean nomograms and conversion table of an unusual character. *Subject Headings:* **1. Synoptic analysis 2. Manuals 3. Tropopaus analysis 4. Jet stream analysis.**—*M.R.*

5D–217 551.509.58:551.515

§Uwai, K., **Tropopause wave and typhoon (I).** *Geophysical Magazine*, Tokyo, 23(4):309–32 May **1952.** 22 figs., 20 refs., 10 eqs. Also: **Analysis of typhoons in 1950 (II).** *Journal of Meteor logical Research*, Tokyo, 4(2,3):58–71; 118–125, May **1952.** 24 figs., 20 refs. English summari p. 3–4; 8–9. And: **Tropopause wave and typhoon (II).** *Journal of Meteorological Research*, Toky 5(1):1–18, March **1953.** 8 figs., 7 refs. English summary p. 1–2. **DWB**—In the first paper, th author develops a limited method for forecasting the path of a typhoon based upon the fact that th typhoon moves in a tropopause trough, enters the region of interference between two tropopaus troughs, which lie in the temperate westerlies and accompany the jet stream, and then decay rapidly over Japan. The tropopause analysis is based upon aerological data for the 300 mb surfac the isopleth of temperature distribution with height above the 300 mb surface and the topograph change of isobaric surface. In the second paper, position and movement of tropopause wave trough are studied in relation to troughs on the 300 mb surface. It is thought that the existence of 30 mb troughs can be shown more distinctly by using the distribution chart of tropopause height Examples of multiple tropopause seen in figs. 9 and 10. Velocity of motion of tropopause wav found to be considerably less than wind speeds in the troposphere or stratosphere. Typhoon mov ment as related to tropopause trough alignment studied for the cases of specified typhoons in 19 and 1951. The continuation of this paper comprises the formulation of forecast rules for typho paths based on a study of the relation between shifts in the jet stream and the motion of typho centers and of the area of higher tropopause which appears in front of and moves with the typho Part II contains further discussion of the various types of tropopause waves associated with th Intertropical Convergence Zone, and the 300 and 200 mb surfaces and the relationship betwe those waves and the movement of tropical cyclones. "Westward movement of the tropopause wav (300 mb level) in which typhoons move northward comes to an end when the wave length reach the critical length given by Rossby and Haurwitz well known formula (4.1) or (4.4)." Life cyc of a tropopause low is traced (fig. 6) and found similar to MCDONALD's four stages of a typhoon li cycle. (For fuller abstract of first paper *see item* 5.3–108, March 1954, *MAB.*) *Subject Heading* **1. Typhoon track forecasting 2. Tropopause waves 3. Tropopause analysis 4. Japan.**—*I.L.D M.P.K.*

1953

5D–218 551.524.7:551.510.5

Bannon, J. K. and Gilchrist, A., **A statistical study of the variation of temperature in the tropo sphere and lower stratosphere.** *Great Britain. Meteorological Research Committee*, *M.R.P.* 81 May 30, **1953.** 12 p. 10 tables, 19 refs. Mimeo. **GB-MO**—To find latitude and season f which Dines' model applies, correlations were evaluated for stations from 73°N to Malta betwe height of 300 mb level (H_{300}), tropopause pressure (P_T) and temperatures at 500–60 mb. Resul are set out in detailed tables. Causes of variable stratosphere coefficients are discussed, includin different effects of vertical motion and advection in different latitudes, seasons and years. Relatio between temperature in lower stratosphere and P_T or H_{300} decreases with height. Dines' mod holds only in regions affected by travelling depressions and anticyclones. *Subject Headings:* **1. Upp air temperatures 2. Tropopause pressure.**—*C.E.P.B.*

5D–219 551.557.36:551.510.52/3(46)

Bannon, J. K. and Jackson, M. P., **Relation between tropopause and level of maximum wind at Gibraltar.** *Meteorological Magazine*, London, 82(970):100–102, April **1953.** 2 figs., table, ref **DWB**—Pressure levels of maximum winds of 50 knots or more at Gibraltar are compared with pressure at tropopause. Little relation was found, but wind maximum averages about 40 mb below tropopause. (*Same item as* 4E–250, May 1953, *MAB.*) *Subject Headings:* **1. Upper air wind variations 2. Tropopause wind relationships 3. Gibraltar.**—*C.E.P.B.*

5D–220 551.509.31:551.515.8

§Berggren, Roy, **On frontal analysis in the higher troposphere and the lower stratosphere.** *Arkiv för Geofysik*, Stockholm, 2(2):13–58, **1953.** 22 figs., 3 tables, refs. p. 58. Also in: *Uppsala. Universitet. Meteorologiska Institutionen, Meddelande*, No. 29. **DLC**—The representation of the three dimensional structure of the atmosphere by means of vertical cross sections in space and time is analyzed with regard to the problem of combining in a vertical cross section: 1) the extended front, 2) the two (or more) tropopauses which can be seen between 500 and 200 mb in the ascents and 3) the discontinuities observed in the stratosphere. This problem is discussed for the following cases: warm front, cold front, occluded front, cold domes and an idealized vertical cross section through a high reaching front. *Subject Headings:* **1. Cross sections 2. Synoptic aerological studies 3. Multiple tropopause 4. Northwest Europe.**—*I.L.D.*

5D–221 551.510.52/3

*Bostick, A. W., **Climatological study of the tropopause and its relationship to conditions at the 500 mb level.** B.S. Thesis—Massachusetts Institute of Technology, **1953.** 28 p. 7 figs., 2 tables, 6 eqs., refs. Copy on file at ASTIA Document Service Center, Dayton, Ohio: ATI No. 201761. **MCM**—Correlation of winter height and temperature of tropopause with latitude, 500 mb height, 500 mb temperature, and circulation by means of regression equations. Values of regression parameters as well as frequency distribution of height of tropopause above the 500 mb height with means and standard deviations are given for numerous North American stations. Correlation found good for the general area of the westerlies at 500 mb and poor over the Gulf of Mexico and central Canada. The presentation does not include a temporal breakdown. *Subject Headings:* **1. Tropopause correlations 2. Tropopause height 3. Tropopause temperature.**—*U. S. Air Weather Service.*

5D–222 551.557.3:551.510.52/3

†Faust, Heinrich, **Die Nullschicht, der Sitz des troposphärischen Windmaximums.** [The zero layer, the site of the tropospheric wind maximum.] *Meteorologische Rundschau*, 6(1/2):6–15, Jan./Feb. **1953.** 12 figs., 3 tables, 57 refs. **DWB**—Deep pressure systems over central Europe change the sign of their vertical wind components at about 10 km, where the ageostrophic mass transport changes direction. This "null layer" which coincides with the subtropopause wind maximum, is at about 15 km in tropics (2 km below tropopause) to 8 km in 75°N (0.5 km below tropopause). It is the level of most rapid change of pressure surfaces and of great significance for the dynamics of weather. (*Same item as* 4E–253, May 1953, *MAB.*) *Subject Headings:* **1. Upper air wind variations 2. Tropopause wind maximum.**—*C.E.P.B.*

5D–223 551.557

Gilchrist, A., **Upper winds in the tropics and subtropics.** *Great Britain. Meteorological Research Committee, M.R.P.* 795, April **1953.** 12 p.+27 figs., 22 refs. **DWB**—A rapid survey of upper wind in the low latitudes (40°N–40°S) using all available Jan., April, July and Oct. 1951 data for 300 mb, 200 mb, 150 mb and 100 mb. Charts of mean winds at constant pressure levels and mean atmospheric cross-sections at selected longitudes show mean atmospheric flow. Cross sections at 80°W indicate the structure of the wind maximum to the south of the polar jet stream. Tropopause height is plotted on all cross sections along with isopleths of west wind speed and of potential temperature. *Subject Headings:* **1. Upper air winds 2. Jet stream 3. Tropical meteorology 4. Tropopause height 5. Tropopause wind relationships 6. Cross sections.**—*M.P.K.*

5D–224 551.557:551.510.52/3

Gold, E., **The variation of wind near the tropopause.** *Meteorological Magazine*, London, 82(973):194–198, July **1953.** ref., 3 eqs. **DWB**—Occurrence of max. wind 30–40 mb below tropopause indicates that thermal wind is reversed at that level. Variation of wind near tropopause is related to slope of the latter and to temperature lapse. It is evaluated for lapse rate at tropopause: inversion, decrease of lapse rate, change of lapse rate to zero below tropopause, and lapse rate changing towards higher pressure. (*Same item as* 4.11–192, Nov. 1953, *MAB.*) *Subject Headings:* **1. Upper air winds 2. Tropopause wind relationships.**—*C.E.P.B.*

5D–225 551.513.2:551.510.52

Goldie, A. H. R., **Global circulation of air at high level and mechanism of change of tropopaus level.** *Meteorological Magazine*, London, 82(973):198–210, July **1953.** 4 figs., 4 tables, 10 ref **DWB**—Temperatures at Larkhill, Eng., are plotted in relation to tropopause level and temperatu at equator (Jan., July). Inferring that air in lower stratosphere of mid- and high latitudes ha drifted from upper 4 km of tropical troposphere, it is found from average temperatures in mi latitudes, tropopause to 18 km, that 62% in winter and 36% in summer of heat gained by adiabat subsidence is lost by radiation. Daily rate of loss 0.5°F in winter and 0.25°F in summer. In pola regions radiation loss equals or exceeds adiabatic gain. (*Same item as* 4.11–114, Nov. 1953, *MAB* *Subject Headings:* **1. General circulation 2. Temperature of the stratosphere 3. Tropopause heigh** —*C.E.P.B.*

5D–226 551.58

Mironovitch, Valéry, **Essai d'une coupe aérologique verticale à travers les deux hemisphères d 0 à 22 km.** [Attempt at an aerological vertical cross section through the two hemispheres from to 22 km.] *Annales de Géophysique*, 9(4):285–290, Oct./Dec. **1953.** 2 figs., 8 refs. French an English summaries p. 285. **MH-BH**—The author outlines a vertical cross-section giving the stru ture of the atmosphere from pole to pole along the meridian 150°E, for winter and summer separatel The diagrams (fig. 1 and 2) contain standard isobaric contours, positions of tropopauses, and isove of the geostrophic zonal wind. They show: a) A deep modification of the thermal structure of th atmosphere between 18 and 21 km. b) A complex structure of the tropopause in the equatori belt (double tropopause in tropics, disconnected from polar tropopauses). c) The presence of mar jet streams in the westerlies and easterlies, located in the troposphere and lower stratosphere. *Subje Headings:* **1. Cross sections 2. Multiple tropopause 3. Tropical tropopause 4. Polar tropopaus** —*Author's abstract.*

5D–227 551.51

Mironovitch, Valéry, **Representation de la circulation atmosphérique générale pour une coup aérologique méridienne à travers les deux hemisphères.** [Representation of the general circulati of the atmosphere on a meridional cross section through both hemispheres.] *Académie des Science Paris, Comptes Rendus*, 236(4):404–406, Jan. 26, **1953.** 2 figs. **DWB**—Meridional cross sectio up to 22 km along 50°W long. (N. Hem.) and 150°W (S. Hem.) for winter and summer separate show mean height of tropopause and isopleths of zonal geostrophic wind (using direct observatio in equatorial regions). Tropopause discontinuity in jet stream region is shown. Also tropical an equatorial tropopauses are distinguished. *Subject Headings:* **1. Tropopause profiles 2. Jet strea profile 3. General circulation 4. Aerological cross sections 5. Tropopause types.**—*M.R.*

5D–228 551.515.21:551.510.52

*Nojima, H., **Typhoon "Ruth" observed at Tateno.** *Tateno, Japan. Aerological Observato Journal*, 5(2):137–142, Jan. **1953.** 6 figs., 2 tables, 2 refs. In Japanese, English summary p. 13 **DLC**—Structure of typhoon "Ruth" (Oct. 8–16, 1951) is shown in diagrams and cross sectio The latter show temperatures and winds at every level to 30 mb and height of tropopause Oct. 14– (6-hourly soundings) at Tateno, Japan. A table gives height, pressure, temperature and potenti temperature of tropopause during this period. Two levels of tropopause are given for each soundin and they are called "double tropopauses" but some are only 400 to 600 m apart. During the pro imity of the typhoon the tropopause was high and cold. Vertical velocities and amount of pr cipitable water in the typhoon were calculated. (For additional data *see item* 4.2–124, Feb. 195 *MAB.*) *Subject Headings:* **1. Tropopause in typhoons 2. Tropopause data 3. Typhoon "Ruth (1951) 4. Vertical velocities 5. Precipitable water data 6. Tateno, Japan.**—*M.R.*

5D–229 551.510.52/3(9

Rubin, Morton J., **Seasonal variations of the Antarctic tropopause.** *Journal of Meteorolog* 10(2):127–134, April **1953.** 3 figs., 6 tables, 18 refs. **DWB**—Upper air temperatures at Litt America (78°28'S, 164°55'W) are compared with those at Arctic Bay (73°16'N, 83°21'W). winter the tropopause in the Antarctic disappears on many days. Radiative cooling is calculate and found to lead to an increased lapse rate in lower stratosphere, in absence of exchange with low latitudes. A. COURT's explanation (*see* 5D–120 above) that the disappearance of the tropopa in winter is due to this absence of exchange is confirmed by daily synoptic S. Hemisphere cha (*Same item as* 4.11–91, Nov. 1953, *MAB.*) *Subject Headings:* **1. Tropopause disappearance 2. An arctic tropopause 3. Antarctica. I. Court, A.**—*C.E.P.B.*

5D–230 551.509.3:551.5

Yamashita, H., **A method of weather forecasting by meteorological change near tropopaus** *Journal of Meteorological Research*, Tokyo, 4(5):179–185, Aug. **1952.** 4 figs., 2 tables, 8 refs.

Japanese, English summary p. (13–14). **2nd report.** *Ibid.*, 5(6):465–473, July **1953.** 6 figs., 2 tables, 7 refs. English summary p. 465. **MH-BH**—In first report author investigates variations in height and temperature of the tropopause. When the height is increasing and the temperature decreasing at the tropopause, the advection of tropical air is expected. This is a good tool for weather analysis concerning the development and movement of low pressure, and also for locating the tendency of a "Bai-u" front to change to warm frontal activity in the late "Bai-u" season. The second report is a further investigation of tropopause temperature in relation to subsequent synoptic developments. (*Same item as* 4.11–70, Nov. 1953, *MAB.*) *Subject Headings:* **1. Weather forecasting 2. Tropopause height 3. Tropopause temperature 4. Bai-u.**—*From author's abstract.*

1954

5D–231 551.511:551.510.53

*†Goody, R. M., **The physics of the stratosphere.** Cambridge, Eng., University Press, **1954.** 187 p. 60 figs., 17 tables, eqs., bibliog. p. 176–181. *Cambridge Monographs on Physics.* **DLC**—In Chap. I the discovery of the stratosphere and the nature of the tropopause are covered. Chap. II (temperature) takes up the theory of formation of stratosphere, the types of tropopause, regional and seasonal variations, correlation between H_e and other elements, waves in tropopause, etc. Chap. V (wind and turbulence) discusses and illustrates wind conditions at the tropopause as well as above and below, and Chap. VI (radiation) gives a more thorough treatment of the various theories of tropopause formation (p. 169–175). *Subject Headings:* **1. Upper atmosphere physics 2. Tropopause theory 3. Textbooks.**—*M.R.*

5D–232 551.510.52:551.557:551.558

*†§Sawyer, J. S., **Day to day variations in the tropopause.** *Great Britain. Meteorological Office, Geophysical Memoirs*, 11(92), **1954.** 40 p. 31 figs., 2 tables, 43 refs. At head of title, M.O. 530g. **DWB**—A detailed analysis of topography of tropopause over eastern N. Atlantic and Europe is described, based on charts of tropopause height and surface pressure at 6 hr. intervals in May 1949, with historical introduction. Trajectories of air movement show that at one place half the changes of tropopause height were due to advection, the remainder to vertical motion. The characteristic features of tropopause charts are set out schematically and with synoptic examples; they include relations of folds to frontal zones, depressions and jet streams, the latter being discussed in detail. Other features are formation and occlusion of tongues of high tropopause, dissolution and reformation by subsidence, and "tropopause funnels" (discontinuous centers of very low tropopause). The tropopause moves with the air as a material surface but there is transfer of air upwards and downwards across it. (*See also* 5D–194 above.) *Subject Headings:* **1. Tropopause height 2. Vertical motion 3. Advection 4. North Atlantic 5. Europe.**—*C.E.P.B.*

5D–233 551.506.7:551.510.52/3

*U. S. Weather Bureau, **Meteorological and climatological data. Aerological observations. Climatological Data, National Summary.** First issue, 1(1), Jan. **1950**–5(1), Jan. **1954** (latest rec'd). Tables. **DWB**—Tables give the monthly mean altitude and temperature of the tropopause at various stations in the U. S. and Alaska. Prior to Jan. 1950, the monthly aerological data tables were published as a component part of the *Monthly Weather Review.* *Subject Headings:* **1. Tropopause height data 2. Tropopause temperature data 3. Monthly data bulletins 4. Alaska 5. United States. I. Thom, Earl C.**—*M.P.K.*

SUPPLEMENTARY MATERIAL

5D–234 551.510(98)

†*Guterman, I. G., **Osobennosti stroeniia atmosfery nad poliarnymi oblastiami.** [Peculiarities of the atmosphere over the Arctic regions.] *Leningrad. Arkticheskii Nauchnoissledovatel'skii Institut, Trudy*, v. 122, **1938.** 79 p. 23 figs., 43 tables, 31 refs. **DLC**—In a discussion of the vertical temperature gradient, temperature inversions, annual and diurnal temperature variations, and maximum and minimum temperatures over the Arctic, p. 48–58 are devoted largely to tropopause. Text includes remarks on annual variation of tropopause temperature and height, tropopause types, relation between tropopause height and temperature (*see* table 36) and relation of tropopause height and temperature to surface pressure (fig. 16). Tables 28–37 show tropopause types (*see also* fig. 15), temperature, height, surface temperature and pressure for Efi and in some cases for Slutsk, latitudinal variation of tropopause height and temperature over stations between 45 and 80°N and quarterly mean tropopause temperature and height for Franz Joseph Land and Slutsk (table 29). *Subject Headings:* **1. Vertical temperature distribution 2. Tropopause temperature data 3. Tropopause height data 4. Efi, U.S.S.R. 5. Slutsk, U.S.S.R. 6. Franz Joseph Land, Arctic.**—*M.P.K.*

5D–235 551.510.52/53:551.55

Durst, C. S. and Swinbank, W., **The relationship between the height of the tropopause an the wind in the neighbourhood of the tropopause particularly in regard to the synoptic situatio** [1945?] Unpublished. Copy in: **GB-MO**—Original unchecked. *Subject Heading:* **1. Tropopaus wind relationship.**

5D–236 551.524.7:551.510.5

Goody, R. M., **The thermal equilibrium at the tropopause and the temperature of the lowe stratosphere.** *Royal Society of London, Proceedings*, Ser. A, 197:487–505, **1949.** 3 figs., 5 table 19 refs., eqs. **DWB**—Further considerations along the lines of EMDEN's methods lead to continuit of temperature at the tropopause as a condition for a stable transition from a state of convective t radiative equilibrium. This explains the characteristic appearance of the temperature distributio near the tropopause. Application of this condition leads to a simple explanation of the latitud variation of stratosphere temperature, mainly in terms of the effects of water vapor and CO_2. TH variation of stratosphere temperature with ozone concentration may be calculated, which confirm DOBSON's hypothesis that anomalous seasonal variations of stratospheric temperature are due t seasonal variations of ozone concentration. Reasons for the approximately isothermal characte of the lower stratosphere are also discussed. *Subject Headings:* **1. Tropopause temperature 2. Tem perature of the stratosphere 3. Ozone.**—*Author's abstract.*

5D–237 551.506.7:551.510.5

Gutenberg, B., **New data on the lower stratosphere.** *American Meteorological Society, Bulleti* 30(2):62–64, Feb. **1949.** fig., table, 7 refs. **DWB**—Brief discussion of rawinsonde observatio to 30+ km starting in March 1947 over White Sands, New Mexico. Tropopause found usual between 45 and 55,000 ft (ca. 15 km) with maximum wind velocity generally at 40,000 ft (12 km References made to accounts of other wind, pressure and temperature observations from very gre heights. *Subject Headings:* **1. Stratospheric research 2. Tropopause height 3. White Sand New Mexico.**—*M.P.K.*

5D–238 551.510.52

Romantsov, I. I. and KHvostikov, IA., **Fotografirovanie tropopauzy v poliarizovanom svet** [Photographing tropopause in polarized light.] *Akademiia Nauk SSSR, Doklady*, 53(8):707–70 **1949.** 5 figs.—Unchecked. *Subject Heading:* **1. Tropopause photography.**

5D–239 551.515.127:551.513

†§Palmén, Erik, **The aerology of extratropical disturbances.** (In: **Compendium of Meteorolog** Boston, American Meteorological Society, **1951.** p. 599–620. 16 figs., 64 refs., 17 eqs.) **DWB** Mean cross sections (p. 601, 603) show tropopause height, configuration, breaks and relationship jet stream over N. America and Europe. Vertical cross sections (p. 614) illustrate a case of multip tropopauses over SW U. S. as related to wind and frontal pattern and (p. 617) a case of a deep dr in the tropopause associated with a high level cyclone over the same geographical area. (For full abstract *see* 3.5–8, May 1952, *MAB.*) *Subject Headings:* **1. Aerological cross sections 2. Trop pause—jet stream relationships 3. Tropopause breaks 4. Synoptic aerological studies 5. Unite States 6. Europe.**—*M.P.K.*

5D–240 551.515.2:551.510.52

§†*Japan. Central Meteorological Observatory, Tokyo, **Data of the typhoon "Ruth."** *Japa Central Meteorological Observatory, Tokyo, Memoirs*, 37(1/2):1–178, **1952.** tables, charts, 64 plate 284 refs. p. 259–276. In Japanese; foreword and legends in English. **DWB**—Height, pressu and temperature of tropopause is given for 29 stations in Japan and vicinity for each day (wh reached) from Oct. 8 to 15, 1951 during the passage of the 1951 Ruth Typhoon. Double tropopaus are noted. Highest 18.8 km (70 mb); lowest 9.9 km (267 mb). Coldest −84.0°C at 17.8 k (Tore). (Report also contains detailed hourly synoptic charts, sferics reports, dropsonde, surfa upper air anemograph and rain gage recorder records, etc.) (*Same item as* 4.2–124, Feb. 19 *MAB.*) *Subject Headings:* **1. Multiple tropopause 2. Tropopause data 3. Tropopause in typhoo 4. Sferics 5. Dropsonde observations.**—*M.R.*

5D–241 551.510.52/3:551.5

§U. S. Air Weather Service, **Tropopause analysis and forecasting.** *U. S. Air Weather Servi Technical Report* 105–86, March **1952.** 31 p. table, charts, 31 refs. **DWB**—In this manual the is presented for the first time a complete and detailed scheme for identifying the tropopause single stations and on synoptic charts (constant pressure and tropopause charts) and for maki prognostic tropopause charts. The complexity of the problem of analysis is recognized and simplifi

as much as possible by using the predominant tropopause and indicating breaks (where foliation occurs) by heavy dashed lines. A sample analysis is presented and discussed (March 20–22, 1951) and compared with 500 mb charts for the U. S. for the same periods. Detailed instructions and models are given for identifying the tropopause. *Subject Headings:* **1. Tropopause analysis 2. Synoptic upper air analysis 3. Manuals.**—*M.R.*

5D–242 551.524.7 551.515.8

Berggren, Roy, **On temperature frequency distribution in the free atmosphere and a proposed model for frontal analysis.** *Tellus*, 5(1):95–100, Feb. **1953.** 5 figs., table, 9 refs. **MH-BH**—Following the method used by McIntyre (1950), the author constructs frequency histograms for temperatures at 250, 200, 170 and 150 mb at Lerwick and Aldergrove, and for 700, 500, 300, 200 and 150 or 100 mb at Tatoosh Island, Washington and Miami, Fla., showing a sharp single maximum at 250 or 300 mb at all stations, and a tendency towards secondary maxima at 200, 170 and 150 mb except at Miami where the secondary maximum occurred only at 100 mb. This is explained by the higher, colder troposphere of tropical air compared to the polar air masses which prevail over the northern stations, the fact that Miami is almost always in tropical air above 700 mb, and the fact that both polar and tropical air have the same temperature at the 300 or 250 mb level. The author concludes that the (sloping) baroclinic fields in the troposphere and lower stratosphere are demonstrated by this frequency analysis. (*Same item as* 5.2–146, Feb. 1954, *MAB.*) *Subject Headings:* **1. Upper air temperature frequencies 2. Tropopause temperature variations 3. Frontal analysis 4. Lerwick, Scotland 5. Aldergrove, Ireland 6. Tatoosh Island, Washington 7. Miami, Florida. I. McIntyre, D. P.**—*M.R.*

5D–243 551.511(02) 551.510.52/3

†*KHrgian, A. KH., **Fizika atmosfery.** [Physics of the atmosphere.] Moscow, **1953.** 456 p. 220 figs. (some fold.), 119 tables, numerous eqs., 9 refs.+numerous foot refs. **DAWS** (Air Weather Serv. Tech. File)—In this competent modern text on atmospheric and upper air physics there are numerous references to the structure, origin, movements and geographical or synoptic variations in mean and individual tropopauses, the radiation balance (p. 144), temperature and height (p. 199–204), the tropopause in cyclones and anticyclones (p. 385–387), meridional cross sections of wind and temperature showing relation of polar and tropical tropopause break to jet stream ("struĭnoe teh-enie"), p. 415–417 and to frontal zones (p. 428). (For fuller abstract of textbook see subsequent issues of *MAB.*) *Subject Headings:* **1. Tropopause structure 2. Tropopause—jet stream relationships.**—*M.R.*

5D–244 551.557:551.558.29

Vuorela, Lauri A., **On the air flow connected with the invasion of upper tropical air over northwestern Europe.** *Helsinki. Universitet. Meteorologian Laitos, Mitteilungen*, No. 75, **1953.** 17 figs., 14 refs. **DWB.** Reprint from: *Geophysica*, Helsinki, 4(3):105–130, **1953. DLC**—Some vertical cross sections illustrating cases of invasion of upper tropical air in higher latitudes are presented. In particular, the behaviour of the tropopauses and the appearance of a pronounced baroclinicity in the vicinity of the upper portion of the polar front, as well as the strong latitudinal change of shear connected with the region of the zonal wind maximum have been subjected to a more detailed discussion. A simple model of the vertical cross-stream circulation superimposed upon the zonal flow associated with the polar front and the polar-front jet stream, based upon conclusions drawn from careful analyses of dew-point differences, has been suggested. Attention has also been called to the analogy with conditions appearing in connection with the "subtropical" jet stream. *Subject Headings:* **1. Synoptic aerological studies 2. Upper air analysis 3. Cross sections 4. Tropopause—jet stream relationships 5. Northwestern Europe.**—*Author's abstract.*

5D–245 551.510.52/3

Bostick, Arthur W., **Specification of the tropopause height and temperature from 500-mb data.** Thesis (*Master of Science*)—M.I.T., Dept. of Meteorology, Jan. 18, **1954.** 57 p. 9 figs., 13 tables, 14 refs. Original unchecked. **MCM**—Regression equations are determined which enable the specification of the tropopause height and temperature from parameters such as latitude, distance to the jet stream, 500-mb height and temperature, 500-mb 24 hr lag temperature, 700-mb temperature and the location of the station with reference to the trough-ridge pattern. Best correlation coefficients obtained were 0.80 and −0.59 between 500-mb temperature and tropopause height and temperature, respectively, in the general area of the 500-mb zonal westerlies over North America and 0.62 and −0.13 between 500-mb temperature and tropopause height and temperature over central Canada. *Subject Headings:* **1. Tropopause height correlations 2. Tropopause temperature correlations 3. Tropopause forecasting 4. North America.**—*From author's abstract.*

5D–246 551.510.52/3:551.524.3

*Björkdal, Erik, **On the correlation between the geopotential of the tropopause and the temperature of the middle troposphere.** *Geofysiske Publikasjoner*, Oslo, 12(15), **1940.** 6 figs., 4 tables, 16 refs., eqs. **DWB**—Observations from Scandinavia, Scotland and Germany give, as a mean, a correlation coefficient of 0.78 between the temperature at 5 gkm and the geopotential of the tropopause. Regression coefficient (average 0.18) seems to be a linear function of the latitude, increasing northwards. Statistical results indicate that air masses which travel northwards are generally heated in the middle troposphere. Synoptic maps show cases where the displacement of disturbances at the ground is parallel to the isotherms at 5 gkm with the warm air to the right. Method given to construct maps for the dynamic topography of the tropopause by combining direct measurements of the geopotential and approximate values, estimated from the measured temperature at 5 gkm. Motion of cirrus clouds taken into account. *Subject Headings:* **1. Tropopause temperature correlations 2. Tropopause charts 3. Northwest Europe.**—*From author's abstract.*

5D–247 551.513.2:551.557

Coudron, J. (*French Met. Service*), **Le jet et les courves de variation de la vitesse moyenne du vent avec l'altitude.** [The jet and the curves of variations of the average speed of wind with altitude.] *Journal Scientifique de la Météorologie*, Paris, 4(16):143–148, Oct./Dec. **1952.** 5 figs., 3 refs. French, English and Spanish summaries p. 143. **DWB**—Peppler's (1919) curve of wind speed vs. altitude from 1–20 km is compared with that compiled by J. Mondain (1949) and with 1950 data for Brest and Trappes using a radiotheodolite (RAWIN). The higher velocities of the last 3 curves are explained on the basis of the poorer sampling with ordinary theodolite used in the 1910–19 decade. The Brest and Trappes data are then related to the tropopause level for: a) winds <50 m/s and b) for cases of a distinct "jet." It shows that the maximum wind occurs at or <1 km below the tropopause for most cases of <50 m/s winds, but that for jet stream winds, the maximum may occur from 1 km above to 4 or more km below the tropopause. *Subject Headings:* **1. Jet stream 2. Tropopause-jet stream relationships. I. Peppler, W.**—*M.R.*

5D–248 551.513:551.551:551.510.52/3

Defant, Friedrich, **On the mechanism of index changes.** Chicago Univ. Dept. of Meteorology, Contract N6ori-20, Task Order II, Project NR 082 003, Technical Report (unnumbered), May **1953.** 31 p. 38 figs., table, 13 refs. **DWB**—A substantial study, showing for selected cases the temperature field (500 mb), the positions of the jet stream, isopleths of geostrophic wind (500 mb) versus latitude, temperature isopleths versus height, meridional height cross sections for temperature and temperature changes, tropopause variations, etc. during periods of high and low index in the Northern Hemisphere. Conditions over the polar cap and the extension of the circumpolar vortex within the jet stream belt are analyzed, and possible tropical impulses are discussed. The height of the Arctic tropopause seems to have a relation to the intensity of the jet stream. *Subject Headings:* **1. Atmospheric circulation 2. Jet stream 3. Tropopause-jet stream relationships 4. Northern Hemisphere 5. Arctic. I. Chicago Univ. Dept. of Meteorology II. Contract N6ori-20.**—*A.A.*

5D–249 551.513:551.510.52/3

Raethjen, Paul, **Tropopausenzirkulation.** [Tropopause circulation.] Abstract in: *Geophysica*, Helsinki, 4(3):141–142, **1953. DWB.** Original unchecked.—In referring to the tropopause circulation, the author means that planetary meridional circulation which extends from the tropics to the polar region with its ascending branch in the tropics and descending branch over the pole and with polewards flowing air masses above the tropopause and equatorwards flowing masses in the upper troposphere. The twofold influence of this circulation 1) on the permanent planetary circulation system and 2) on the disturbances within that system as shown (a) directly by observations and (b) indirectly by dynamic correlations is described with synoptic case illustrations. Discussion by Palmén, Raethjen and Bolin. *Subject Headings:* **1. General circulation 2. Tropopause.**—*M.P.K.*

5D–250 551.510.52/3

§Johnson, D. H., **An extensive double tropopause.** *Meteorological Magazine*, London, 83(981): 76–81, March **1954.** 5 figs., 2 refs. **MH-BH**—A double tropopause at 1500 GMT on Jan. 19, 1950 was found over whole region between Iceland, Tromso, central Europe and 54°N 18°W. The situation is illustrated by 1000 and 300 mb contours, potential temperature and contours of lower and upper tropopause, and a cross section from Iceland to Nimes. Height of each tropopause was greatest over the British Isles, in the center of the upper anticyclones. *Subject Headings:* **1. Multiple tropopause 2. Cross sections 3. Tropopause potential temperature.**—*C.E.P.B.*

PART III. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Note: The contents of periodicals included in this section are for information only, and will not be listed in the monthly indexes until abstracted. When material is furnished in advance of date of publication, the pagination may be omitted.

American Geophysical Union, Transactions, Volume 35, Number 1, February 1954.

Fleming, J. A.: **Origin and development of the American Geophysical Union, 1919–1952,** p. 5–46.
Korff, Serge A.: **Effects of the cosmic radiation on terrestrial isotope distribution,** p. 103–106.
Branscomb, L. M.; Shalek, R. J. and Bonner, T. W.: **Intensity distributions in nitrogen bands excited in auroras and by high-energy protons and hydrogen atoms,** p. 107–113.
Lettau, Heinz: **Improved models of thermal diffusion in the soil,** p. 121–132.
van't Woudt, Bessel D.: **On factors governing subsurface storm flow in volcanic ash soils, New Zealand,** p. 136–144.
Brooks, F. A. and Rhoades, D. G.: **Daytime partition of irradiation and evaporation chilling of the ground,** p. 145–152.
James, Richard W.: **An example of a wave forecast based on energy spectrum methods,** p. 153–160.
Jacobs, J. A.: **Problems connected with the cooling of the earth,** p. 161–163.
Croft, A. R.: **Report of the Committee on Evaporation and Transpiration, 1952–1953,** p. 164–167.
van Bavel, C. H. M.: **Discussion of "A method for approximating the water content of soils" by Nedavia Bethlahmy,** p. 168–171.
Stallman, Robert W.: **Discussion of "The effect of surface head on infiltration rates based on the performance of ring infiltrometers and ponds" by Leonard Schiff,** p. 171–174.
Reviews and Abstracts
Wilson, Walter T.: **O. G. Sutton, Micrometeorology, a study of physical processes in the lowest layers of the earth's atmosphere,** p. 174–175.

American Meteorological Society, Bulletin, Volume 34, Number 10, December 1953.

Fulks, J. R.: **First Session of the Commission for Aerology, WMO, Toronto, 1953,** p. 435–437.
Harmantas, C.: **First Session of the Commission for Instruments and Methods of Observation, Toronto, 1953,** p. 438–440.
Ernst, F. W.: **Verification of a formula for the growth of troughs and wedges,** p. 441–443.
Berry, F. A.; Haggard, W. H. and Wolff, Paul M.: **500-millibar studies at Project AROWA,** p. 444–453.
Neumann, J.: **On a relationship between evaporation and evapotranspiration,** p. 454–457.
Darling, Eugene M., Jr.: **Winds at 100 Mb and 50 Mb over the United States in 1952,** p. 458–461.
Jacobs, Woodrow C. and Spreen, William C.: **Some climatological problems associated with assignment of engineering design criteria,** p. 462–467.

Volume 35, Number 1, January 1954

Weather in the nation's business, p. 1–13.
Fawbush, Ernest J. and Miller, Robert C.: **A basis for forecasting peak wind gusts in non-frontal thunderstorms,** p. 14–19.
Roschke, W. H., Jr.: **The propagation of short period air pressure microoscillations,** p. 20–25.
Wasko, Peter E.: **Pressure and temperature variations over the centers of typical migratory anticyclones,** p. 26–32.
Pearson, C. A.: **Recording horizontal atmospheric transmission of light at night,** p. 33–39.

Angewandte Meteorologie, Berlin, Volume 1, Number 12, December 1953.

Hentschel, G.: **Physiologische Klimatologie der Harzkurorte,** [Physiological climatology of Harz health resorts], p. 353–359.
Würfel, H.: **Über den Tagesgang des Kerngehalts der Luft in Berlin-Buch. Ein Beitrag zur Lufthygiene von Grosstadtrandgebieten,** [On the diurnal variation of the nuclei content of air in Berlin-Buch. A contribution to air hygiene of areas on the outskirts of large towns], p. 360–372.

Zenker, H.: **Brandung und Kondensationskerne an der Ostseeküste,** [Surf and condensation nuclei on the Baltic coast], p. 372–375.

Hentschel, G.: **Die "meteorologische Ausgangslage" in ihrer Bedeutung für die Affizierung des Organismus,** [The "meteorological starting point" and its effects on the organism] p. 375–383.

Conference on Radio Meteorology, Univ. of Texas, Austin, Texas, Nov. 9–12, 1953, Proceedings, v. 1. Published by the University, 1953.

Carroll, Thomas J.: **Tropospheric propagation well beyond the horizon—A review,** Sec. I-1.

Tolbert, C. W. and Straiton, A. W.: **Propagation characteristics of 0.86 centimeter radio waves,** Sec. I-2.

Kiely, D. G.: **Some measurements of fading at a wavelength of 8 mm over a very short path,** Sec. I-3.

Rogers, Thomas F.: **Calculated centimeter-millimeter water vapor absorption at ground level,** Sec. I-4.

Taylor, Paul B.: **Characteristic effects of atmospheric stratification on air-to-air propagation,** Sec. I-5.

Carroll, Thomas J. and Ring, Rose M.: **Important modes in the troposphere treated as a linearly graded layer of dielectric,** Sec. I-6.

Kiely, D. G.: **Rain clutter measurements with C.W. radar systems operating in the 8 mm wavelength band,** Sec. I-7.

Fannin, B. M.: **Field strength determination by ray tracing techniques for horizontally stratified layers,** Sec. II-1.

Northover, Francis H.: **The anomalous propagation of the longer VHF waves,** Sec. II-2.

Ghose, Rabindra Nath: **Factors influencing propagation of VHF waves in the diffraction zone,** Sec. II-3.

Herbstreit, Jack W.: **A review of the National Bureau of Standards tropospheric propagation research program in the 100–1000 mc region,** Sec. II-4.

Bean, Bradford R.: **Prolonged space-wave fadeouts at 1046 Mc observed in the Cheyenne Mountain propagation program,** Sec. II-5.

Thompson, M. C. and Hornberg, K. O.: **The meteorological instrumentation at the Cheyenne Mt. field station,** Sec. II-6.

Crain, C. M. and Gerhardt, J. R.: **Summary and preliminary analysis of tropospheric refractive index measurements,** Sec. III-1.

Bean, Bradford R. and Meaney, Frances M.: **The monthly refractivity gradient for the United States and its application to predicting the geographical and annual trend of VHF transmission loss,** Sec. III-2.

Cowan, Leslie W.: **A radio climatology survey of the U. S.,** Sec. III-3.

Bellaire, F. R. and Arvola, W. A.: **Prediction of diurnal field strength patterns by synoptic methods,** Sec. III-4.

Anderson, L. J. and Gossard, E. E.: **Verification of surface-duct,** Sec. III-5.

Hood, A. D. and Doherty, L. H.: **Radar forecasting on Lake Ontario,** Sec. III-6.

Gordon, W. E.: **Radio scattering from a turbulent elevated layer,** Sec. IV-1.

Swingle, Donald M.: **Reflections of electromagnetic waves from media of continuously variable refractive index,** Sec. IV-2.

Plank, Vernon G.: **A meteorological study of angels at 1.25 cm,** Sec. IV-3.

Inoue, Eiichi: **Diffusion of a smoke puff as a turbulence measure in the atmosphere,** Sec. IV-4

Ogura, Y. and Yakoda, K.: **Structure of two and three-dimensionally isotropic turbulence in the atmosphere,** Sec. IV-5.

Jones, H. L.: **Correlation between sferics and tornado incidence,** Sec. V-1.

Weil, Joseph and Newman, M. M.: **Correlation of thunderstorm atmospherics measurements,** Sec. V-2.

Newman, M. M.; Stahmann, J. R. and Anderson, J. R.: **Recording and classification of thunderstorm atmospherics by counter techniques,** Sec. V-3.

Pierce, E. T. and Wormell, T. W.: **Atmospherics waveforms and the location of thunderstorms,** Sec. V-4.

Newman, M. M.: **The lightning discharge propagation mechanism effect on atmospherics waveforms including "whistlers,"** Sec. V-5.

Swingle, D. M.: **Thunderstorm identification on the PPI,** Sec. V-6.

Austin, Pauline M.: **Information obtainable from quantitative observations of radar echoes from precipitation,** Sec. VI-1.

Reynolds, S. E.: **Cloud physics—A review,** Sec. VI-2.

Nakaya, Ukichiro: **Growth of snow crystals,** Sec. VII-1.

Johnson, David S.: **Application of radar to cloud physics research in Hawaii,** Sec. VII-2.
Wexler, Raymond and Austin, Pauline: **Radar signal intensity from different levels in continuous precipitation,** Sec. VII-3.
Gunn, K. L. S.: **Radar evidence of a generating level for snow,** Sec. VII-4.
Wexler, R. and Honig, J.: **Atmospheric cooling by melting snow,** Sec. VII-5.
Donaldson, R. J.; Atlas, D.; Paulsen, W. H.; Cunningham, R. M. and Chmela, A. C.: **Quantitative 1.25 cm observations of rain and fog,** Sec. VII-6.
Marshall, J. S.: **The effects of wind shear on falling rain,** Sec. VIII-1.
Jones, Douglas M. A. and Dean, Lawrence A.: **Some observations from photographs of falling raindrops,** Sec. VIII-2.
McDonald, James E.: **Deformation of large raindrops,** Sec. VIII-3.
Atlas, David: **Optical extinction by rainfall,** Sec. VIII-4.
Hitchfeld, Walter: **Measurement and detection of rainfall by radar at attenuating wavelengths,** Sec. IX-1.
Neill, J. C.: **Variance of areal-mean thunderstorm rainfall estimates,** Sec. IX-2.
Farnsworth, G. W. and Mueller, E. A.: **Radar-rainfall area integrator,** Sec. IX-3.
Ligda, Myron: **Operational utilization of radar storm observations,** Sec. X-1.
Rockney, Vaughn D. and Jay, Lee A.: **The radar storm detection program of the U. S. Weather Bureau,** Sec. X-2.
Williams, Edwin L.: **The present status of the AN/CPS-9 program,** Sec. X-3.
Swingle, Donald M.: **A review of results of operational tests of radar cloud detection equipment,** Sec. X-4.
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Ligda, Myron: **The use of radar storm observations for weather forecasting,** Sec. XI-1.
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Richards, William J.: **The frequency of radar storm echoes as a function of position,** Sec. XI-3.
Swingle, Donald M. and Richards, William J.: **The variability of the motion of radar precipitation lines,** Sec. XI-4.
Swingle, D. M. and Rosenberg, L.: **Mesometeorological analysis of cold front passage using radar weather data,** Sec. XI-5.
Atlas, David; Paulsen, W. H.; Donaldson, R. J.; Chmela, A. C. and Plank, V. G.: **Observation of the sea breeze by 1.25 cm radar,** Sec. XI-6.
Fleischer, Aaron: **The radar as a turbulence sensing probe,** Sec. XI-7.

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No. 2 Garbell, Maurice A.: **A new system of surface markings for aircraft runways.** 1953.
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No. 4 Garbell, Maurice A.: **The timing of airport traffic control as influenced by weather and aircraft performance.** 1951.
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Geofisica Pura e Applicata, Milan, Volume 26, 1953.

Castoldi, Luigi: **Di un nuovo universo dinamico relativistico,** [A new dynamic relativistic Universe], p. 1–10.
Kunz, B.: **Strahlenkrümmung und Wellengeschwindigkeit,** [Ray-refraction and wave velocity], p. 10–15.
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Berroth, A.: **Bestimmung der Schwingungszeit eines Pendels durch Ausmessung und Ausgleichung einer ganzen Koinzidenzkurve,** [Determination of the oscillation period of a pendulum by measurement and adjustment of the entire coincidence curve], p. 20–29.

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Belluigi, Arnoldo: **Su un "matranslog" di massimo rendimento,** [A matranslog of highest efficiency], p. 67–74.

Rau, Walter: **Nachweis der allgemeinen Gültigkeit des Gefrierkernspektrums,** [Evidence of the general validity of the freezing nuclei spectrum], p. 75–87.

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Schulte-Vennbur, Hermann: **Niederschlagsstrukturen von Zyklonen in Nordamerika,** [Precipitation structure in North American cyclones], p. 97–111.

Ekhart, E.: **Der Jahresgang des Luftdrucks nach Breite und Höhe,** [The annual variation of air pressure with latitude and altitude], p. 112–118.

Schneider-Carius, Karl and Faust, Heinrich: **Grundschicht und Nullschicht der Atmosphäre,** [Ground layer and zero layer of the atmosphere], p. 119–126.

Bider, Max and Verzár, F.: **Kontinuierliche Messung atmosphärischer Kondensationskerne. (Vorläufige Ergebnisse mit dem Registrierenden Kernzähler in Basel),** [Continuous measurement of atmospheric condensation nuclei. (Preliminary results with the recording nuclei counter in Basel)], p. 127–140.

Möller, F.; de Bary, E. and Krog, G.: **Die Farbe des Himmels: II,** [The color of sky, II], p. 141–152.

Albrecht, F.: **Das Impulsaktinometer,** [The impulse actinometer], p. 153–171.

Fleischer, Richard: **Die Strahlungmesskugel nach Larché-Schulze,** [The Larché-Schulze radiation measuring sphere], p. 172–182.

Kreitz, Ernst: **Ein einfaches Gerät zur Registrierung der langwellingen Gegenstrahlung auch bei Tage,** [A simple device for recording long wave back radiation even in daytime], p. 183–190.

Wegener, Kurt: **Die Registrierung der Energie-Verteilung im Sonnen-Spektrum,** [The recording of the energy-distribution in the solar spectrum], p. 191–197.

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Symposium on the utilization of solar energy, p. 211–213.

Kuhn, W.: **La 133me Session Annuelle de la Société Helvétique des Sciences Naturelles Lugano 5–7 Sept. 1953,** [133rd Annual Session of the Swiss Society of Natural Sciences in Lugano Sept. 5–7, 1953], p. 213–214.

Burkard, O.: **Bericht über die 19. Tagung der Deutschen Geophysikalischen Gesellschaft in Hanover, 6.–10. Okt. 1953,** [Report on the 19th Session of the German Geophysical Society in Hanover, Oct. 6–10, 1953], p. 215–216.

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Pramanik, S. K. and Jagannathan, P.: **Climatic changes in India (I)—Rainfall,** p. 291–309.

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Bureau, Robert: **Rèseau d'enregistreurs de P.I.D.B. (reinforcements brusques) sur 11.000 mètres,** [Network of recorders of ionospheric perturbations with sudden intensification at 11,000 m], p. 10–11.

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Kiepenheur, K. O.: **The relations between the solar corona and geomagnetic disturbances,** p. 17–18.
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Newton, H. W.: **A simple numerical illustration of the statistical relationship between great geomagnetic storms and the larger sunspots,** p. 21–22.
Nicolet, Marcel: **Actions de l'atmosphère terrestre sur les équilibres de photo-dissociation et de photo-ionisation par le rayonnement ultraviolet et X du soleil,** [The effect of the terrestrial atmosphere on the equilibrium of photo-dissociation and photo-ionisation by ultraviolet and X rays], p. 23–24.
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Vegard, L.: **Auroral spectroscopy and its bearing on the physics of the ionosphere and on solar-terrestrial relationships,** p. 33–35.

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Weller, Richard I.: **The intensity of beta ray ionization of potassium, uranium and thorium,** p. 1–10.
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